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Seventeenth Biennial
Report

OF THE

State Engineer

TO THE

Governor of Colorado

For the Years 1913-1914

PART ONE

DENVER, COLORADO
THE SMITH-BROOKS PRINTING COMPANY, STATE PRINTERS
1915

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LETTER OF TRANSMITTAL.

Sir: I have the honor to transmit herewith the Seventeenth Biennial Report of the Office of the State Engineer, covering the period December 1st, 1912, to November 30th, 1914, inclusive.

Very respectfully,
JOHN E. FIELD,
State Engineer.

To His Excellency,
ELIAS M. AMMONS,
Governor of Colorado.

LIST OF OFFICIALS IN CHARGE OF WATER DISTRIBUTION.

STATE ENGINEERS OF COLORADO

Since Organization of Department, June 3, 1881.

Eugene K. Stimson	June 1881 to April 1883
Edwin S. Nettleton	April 1883 to April 1887
J. Sire Greene	April 1887 to April 1889
James P. Maxwell	April 1889 to April 1893
Charles B. Cramer	April 1893 to April 1895
Horace A. Sumner	April 1895 to April 1897
John E. Field	April 1897 to April 1899
Addison J. McCune	April 1899 to April 1903
Louis G. Carpenter	April 1903 to April 1905
Thomas W. Jaycox	April 1905 to April 1909
Charles W. Comstock	April 1909 to April 1913
John E. Field	April 1913 to April 1915

LIST OF OFFICERS AND EMPLOYEES

State Engineering Department.

John E. Field	State Engineer
Arthur F. Hewitt	Deputy State Engineer
Emmet C. McAnelly	Deputy State Engineer
Ralph I. Meeker	Deputy State Engineer
Thomas Grieve, Jr	Chief Hydrographer
Harry D. Amsley	Hydrographer
Delos L. Bundy	Hydrographer
Milne E. Bunger	Hydrographer
Charles L. Chatfield	Hydrographer
Clarence O. Crisman	Hydrographer
Charles C. Hezmalhalch	Hydrographer
George P. Woodhall	Hydrographer
Oscar L. Nelson	Draftsman
Ellie H. Rhodes	File Clerk
May A. Bradford	Stenographer and Clerk
Anna O. Finch	Stenographer
Louise D. Smith	Stenographer

IRRIGATION DIVISION ENGINEERS

Div. No. 1	Fillmore Cogswell	Denver
Div. No. 2	Edward R. Chew	Pueblo
Div. No. 3	Frederick W. Swanson	Alamosa
Div. No. 4	Heman C. Getty	Montrose
Div. No. 5	Theodore Rosenberg	Glenwood Springs

WATER COMMISSIONERS

Div. No.	Dist. No.	Name	Address
1	1	J. K. Samples	Brush
1	2	James P. Higgins	Brighton
1	3	John L. Armstrong	Fort Collins
1	4	Howard H. Kelly	Loveland
1	5	N. C. Sullivan	Longmont
1	6	James M. Platte	Boulder
1	7	Wm. M. Elliott	Golden
1	8	Louis Bertolett	Littleton
1	9	J. R. Cruse	Morrison
2	10	F. D. Eubank	Fountain
2	11	Max Dickman	Poncha Springs
2	12	D. S. Jones	Florence
2	13	H. W. Hendershot	Silver Cliff
2	14	H. R. Thompson	Pueblo (Box 148)
2	15	S. T. Curtis	Bulah
2	16	Parson S. Brown	Walsenburg
2	17	G. M. Weybright	Rocky Ford
2	18	Fred Willis	Agusta
2	19	A. C. Windham	Trinidad
3	20	F. C. Spencer	Monte Vista
3	21	Jos. C. Pursley	La Jara
3	22	Wm. Christiansen	Manassa
1-2	23	W. A. Craig	Jefferson
3	24	Gaspar Gallegos	San Luis
3	25	John L. Charles	Crestone
3	26	Alexander Russell	Saguache
3	27	Arthur N. Coolbroth	La Garita
4	28	J. Roy Hicks, Jr	Sargents
4	29	F. A. Byrne	Pagosa Springs
4	30	Wm. E. Tyner	Durango
4	31	No commissioner	
4	32	No commissioner	
4	33	O. J. Legitt	Kline
4	34	H. M. Barber	Mancos
3	35	I. N. Janney	Alamosa
5	36	No commissioner	
5	37	Wm. A. Schliff	Gypsum
5	38	August Naefe	Basalt
5	39	K. E. Shuster	Rifle
4	40	C. H. Luellen	Eckert
4	41	A. J. Baxter	Montrose
4	42	Geo. M. Saunders	Mesa
5	43	Jas. Mikkelson	Sulphur
5	44	Arthur Collom	Axial
5	45	S. B. Potter	Rifle
1	46	J. P. Vaughn	Coalmont
1	47	Clarence Boston	Walden

Div. No.	Dist. No.	Name	Address
1	48	R. E. Moan	Gleneyre
2	49	No commissioner	
5	50	No commissioner	
5	51	J. N. Ostrander	Granby
5	52	Clarence Rundell	Sheephorn
5	53	Jos. H. Macfarlane	Yampa
5	54	E. W. Leggett	Baggs, Wyo.
5	55	No commissioner	
5	56	No commissioner	
5	57	No commissioner	
5	58	F. D. Hutchinson	Yampa
4	59	No commissioner	
4	60	H. C. Browning	Norwood
4	61	Lorenzo Walter	Paradox
4	62	W. O. Brower	Cimarron
4	63	No commissioner	
4	64	John O. Shay	Sterling
1	65	Dwight L. Bower	Wray
2	66	No commissioner	
2	67	Harry A. Pettee	Holly
4	68	J. W. Martin	Ridgway
4	69	No commissioner	
5	70	Geo. F. Newton	De Beque

FOREWORD

STATE IRRIGATION SITUATION

The irrigation situation in the State of Colorado at the present time, to the casual observer, and to those who have gotten out of touch with conditions in the last two years, is little known. As compared with the activity of five or ten years ago, it is very quiet indeed, and on that account the casual observer concludes that irrigation development has ceased, and some, especially among the financial interests of the State, consider it as discredited. To those more closely in touch with the situation, it is almost incomprehensible that the gentlemen who are supposed to have their fingers on the pulses of every branch of business in the State should have any such idea. Briefly, the situation is

First. That speculation has been practically eliminated both in the development of projects and in the purchase of lands.

Second. In the elimination of the speculator and the investor who never really intended to move upon the land himself, a very considerable amount of land has been thrown upon the market, so that today one may obtain choice tracts for very reasonable figures—in my opinion, much less than their intrinsic value.

Third. Those irrigation enterprises which had not been financed and had not reached the construction stage, one might say have been discarded for the present, perhaps wisely so, because in almost every period when there was a large development in irrigation, construction has been several years ahead of the necessities, with the result that they were not profitable to the originators.

Fourth. On those projects which were under construction or which had been financed, the efforts of the builders have been directed to putting the enterprise on a paying basis, ensuring revenue and payment of interest and maintenance. Many of the projects have been changed and only certain portions finished, the idea being to finish in units and settle each unit before another was undertaken.

Fifth. On some projects having considerable merit, although not financed, reorganization has been attempted by making the development a mutual enterprise, eliminating the profit of the promoters and builders, and the cost, whatever it may be, to be distributed on the acreage basis equally, the owners of the land in control electing their own officers and directing their own work on new organization, paying the old organization the value of the work actually accomplished, this of course including investigations and surveys. During the past two years the efforts on old irrigation projects have been directed to increasing the efficiency and where the actual experience has demonstrated that during dry years and dry periods the water supply has been insufficient in obtaining better water supplies.

The San Luis Valley is illustrative of this last condition. The Mosca Irrigation District, using water from the San Luis Ditch and irrigating land in the vicinity of Mosca, has completed a reservoir on Beaver Creek, a tributary of the South Fork of the Rio Grande. Under ordinary conditions this district has an ample supply of water, but to perfect the supply this reservoir was constructed. The Rio Grande Canal, controlled by the Travellers' Insurance Company, has also constructed a reservoir —Santa Maria Lake—and has put the same in operation during 1914. This canal has been in successful operation and the lands under it have grown successful crops for more than twenty years, but with the more intensive cultivation, the higher price of products, the desirability of greater insurance in dry years justified the construction of this reservoir for supplemental supply. The Farmers' Union Canal irrigating lands in the San Luis Valley irrigation district, in the vicinity of the town of Center, had a very good water supply, but constructed the Rio Grande Reservoir near the headwaters of the Rio Grande River, for the purpose of affording a supplemental supply to the land. This reservoir is of such a character that it also gives a supplemental supply to the canal.

One might say that we have passed beyond the promotion period or the period of initiating new enterprises, and that now we are in the period of completion and perfection. A great deal of work is going on all over the State along these lines, and while work is on a small scale in each case, in the aggregate it is very considerable, necessary and desirable.

The period is also marked by another condition which is that there are not enough settlers on the land as yet and the percentage of land irrigated under the new settlers is hardly sufficient to pay the interest charges and maintenance. During the past year those in control of the various enterprises have realized this condition and are making extra effort to get settlement of a permanent character. The speculative element is discouraged and the non-resident holder is not considered desirable. The State, through its Land Board is cooperating along these lines and the sale of state lands in the irrigation districts is generally only under condition that the purchaser enter the district and bear his portion of the interest and maintenance, and the Land Board has tried to place the land at such a figure that it would meet with ready sale and so would begin to contribute its legitimate proportion to the maintenance of the district. The districts, on the other hand, have generally agreed to not require the purchasers to pay back assessments. This was necessary because, in some cases, the back assessments had accumulated to such an extent as to overshadow the value of the land. It is believed that this arrangement will be mutually beneficial and satisfactory and will lead to the more rapid settlement and cultivation of the state lands. The State Land Board has also reviewed the conditions on all of the Carey Act projects, and has cancelled those segregations and contracts where the same appear to be unwise under present conditions. One Carey Act project only has been completed, and this one, the Two Buttes, promises to be a very considerable success, as far as the State and the settler are concerned. In this case the holders of the bonds have cancelled the interest charges of several years and have made the payments much easier than the original contract called for. The result is that some 7000 acres have been put in cultivation and during the past year there was actually in successful crops about 3500 acres.

The season of 1913 was successful. The crops were perhaps somewhat above the average. The season of 1914 was one of the best that the State has ever enjoyed, due largely to the perfection of the irrigation systems and, in part to the fact that the year 1914 was a year of abundant water supply. The year 1915 promises to be fully as successful as 1914. At this writing nearly all of the reservoirs of the State are filled and there is a very considerable amount of water in all of the streams. So that even should 1915 prove to be a very dry season and should there be little snow in the mountains, there will be an adequate water supply in nearly all sections of the State. The outlook at present, however, is that the supply will at least be normal for 1915. The thing most needed at present is more real farmers, and I believe that these will come because, as I have stated, the prices now asked for land and water are, in my opinion, lower than their actual intrinsic value. The prices have gone as low as they will go, and there is a good prospect of a considerable advance in value in the next few years, and as soon as the European War is over and the present depression is ended. It is my belief that it is necessary to offer the settler a bonus for undertaking the development of new land, and it appears to me to be certain that at present prices, with the certainty of advance in a short time, the man who invests at this time, who goes on the land himself and improves it, will find that he not only has developed a proposition which will ensure him a reasonable, but that the certain increase in the value of his holdings, sometimes called "unearned increment", is a sufficient bonus to induce him to pioneer. During the next two years, I look to see a greater acreage of new land successfully put under cultivation than ever before in our history.

COLORADO'S ATTITUDE ON INTERSTATE QUESTIONS AND HOME RULE

Colorado believes in Home Rule and local self government.

Professor Farnham of the College of Law of Yale University says in his great work on "Water Rights": "The establishment and enforcement of laws upon the waters within the limits of the State are absolutely necessary, it being established that the title to the waters and the lands covered by them is in the State. They form a part of its domains and its laws are binding thereon."

Colorado believes in the economy of use and in the greatest good to the greatest number and that these are elements in the consideration of interstate rights.

Colorado believes that each state has certain sovereign and inalienable rights. When natural resources are essential to a state's development, the state has a right to the use of such resources as are within its boundaries in much the same way that independent governments have in furthering their development.

Colorado, as one of the sisterhood of states, believes that an equitable division of the rights between the states, with a due regard to the necessities of each, should control in determining interstate relations.

She believes in the interest of economy in the use of water and that in the proper conservation of this natural resource the use of water high up on the streams is necessary.

Colorado believes and history shows that a diversion of water from one water shed to another is a necessity in the proper utilization of the water supply. In all countries where irrigation has been practiced, we find transmountain and transcontinental diversions as old as written history.

Colorado believes that, although ditches may have been built in other states earlier than in Colorado, where these ditches were abandoned or ceased to be used for any considerable period, the dates of priority of such ditches should be fixed at the time of their reconstruction and actual use and not of date of their inception.

Colorado believes in the utilization of the natural resources at this time and not in their being held for a similar utilization by future generations. She does not believe in retarding development merely because in the past some frauds may have been practiced upon the government or that some of the natural resources have been wasted, or that development should be hindered for the fear that these may at some future time pass into the hands of monopolistic owners.

Colorado has been accused of "assuming to be bigger than the whole United States," and of being "bigger than the government." No such assumption, thought or feeling exists in the State of Colorado. The people do believe, however, that the State has the same rights as every other state in the Union, and that the laws, as made by Congress, are superior to departmental rulings, and that every person, corporation or state believing itself to be injured by departmental rulings and decisions should have the opportunity to take the matter into court for final judicial determination.

Colorado believes that the public lands and natural resources belong to all of the people of the United States but not to the government as a sovereign owner, but that they should belong to the government as a trustee for the whole people, which trusteeship will continue until the individuals signify their desire, under proper regulation, to take over the public lands and natural resources and utilize them. We believe that the public lands and natural resources belong only to such people as are willing to put them to beneficial use and do not belong to such people as elect to remain in the East and are not willing to come West and claim their inheritance and aid in the building up of the West and the utilization of the opportunities offered them.

The West believes that the United States government should in no sense become a landlord, nor the people using the public lands and natural resources become a tenant. The people of the West believe in conservation—in a sane and practical conservation. I quote herewith the resolutions adopted at the Conference of Governors in Denver in the Spring of 1914.

WHAT THE WEST WANTS

Resolutions Adopted Unanimously By the Third Annual

CONFERENCE OF WESTERN GOVERNORS

Held in Denver, Colo., April 9, 10, 11, 1914.

We, the members of the Western Governors' Conference, in convention assembled at Denver, Colorado, April 7, 8, 9, 10 and 11, 1914, do hereby adopt the following resolutions:

CONSERVATION

We believe in conservation—in sane conservation. We believe that the all wise Creator placed the vast resources of this nation here for the use and benefit of all the people—generations past, present and future, and while we believe due consideration and protection should be given to the rights of those who come hereafter, we insist that the people of this day and age should be given every reasonable opportunity to develop our wonderful resources and put them to a beneficial use.

STATE CONTROL

That it is the duty of each and every state to adopt such laws as will make for true conservation of our resources, prevent monopoly and render the greatest good to the greatest number;

and that as rapidly as the states prepare themselves to carry out such a policy of conservation the federal government should withdraw its supervision and turn the work over to the states.

SETTLEMENT OF OUR LANDS

Believing that those who control the soil control the nation, and that the most blessed nations are those where the ownership of lands is in many hands, we insist that in the management and sale of our public lands both the federal government and the state should maintain such a policy as will make for the rapid settlement of all vacant agricultural lands.

DESERT LAND ACT

Resolved, That this convention recommend to Congress amendments of the following nature to the Desert Land Act.

(1) That the entryman's proof of citizenship in the state wherein he makes a desert land filing be changed from the time of filing to the time of proving up.

(2) That the requirements of reclamation be enlarged to embrace the alternative proof of cultivation by the actual growing of crops by dry-farm methods on double the acreage required if by irrigation.

HOMESTEAD ENTRY

We approve the plan now before Congress to permit homestead entries by persons over 18 years of age.

WATER POWER

Whereas, Congress has declared "the water of all lakes, rivers, and other sources of water supply, upon the public lands and not navigable shall remain and be held free for the appropriation and use of the public for irrigation, mining and manufacturing purposes" we insist the federal government has no lawful authority to exercise control over the water of a state through ownership of public lands.

We maintain the waters of a state belong to the people of the state, and that the state should be left free to develop water power possibilities and should receive fully the revenues and other benefits derived from such development.

PRECIOUS METALS

We reiterate our expression contained in Article 10 of the 1913 resolutions referring to the reopening of mineral land, and in addition would urge that the revenues derived from the sale of such lands should be used for the reclamation of the arid lands of the West.

GRAZING LANDS

We believe grazing lands should be so disposed of through an "enlarged homestead" act giving the settler sufficient ground to enable him on a live stock basis to support a family.

SUMMER HOMESTEAD LAW

We favor the passage of a summer homestead law, permitting land not valuable for timber, minerals or agriculture, but suitable for summer homes, to be acquired in not to exceed 40-acre tracts for summer homes. The entryman should not be required to be a resident of the state in which the land is situated, and suitable improvements of the value of $300 in three years' summer residence should be necessary to secure patent.

GOOD ROADS

We reiterate that five per centum of the public lands in the several states should be granted to the said states to aid in construction of permanent roads.

DELAYS—RED TAPE

We believe one of the greatest blessings the officials at Washington could bestow upon the West would be the elimination of all red tape and the taking of prompt action upon all matters pending before the departments and in which the Western states are interested, and we are pleased to note that efforts are already being made in that direction.

INTERIOR DEPARTMENT

We are pleased at the thoughtfulness of the Secretary of the Interior in sending so many of his representatives to the Irrigation Conference now in sesson in this city. We express our appreciation of his intention to adopt a more liberal policy toward the settlement and development of the West, and assure him of our hearty cooperation in this direction.

DONATION OF LANDS

We recommend that 10 per centum of all vacant and unappropriated public lands in each of the arid states be donated to such states and each of them as shall so request, said lands to be sold by said states as other state lands are disposed of, and the proceeds of such sales to form a reservoir fund to be used under the direction of the state for irrigation reclamation purposes.

RECLAMATION PROJECTS

We urgently recommend that the United States reclamation projects now under process of construction be completed at the earliest practicable moment and turned over to the settlers thereunder as soon as can be.

CAREY ACT PROJECTS

We urgently recommend that the United States Reclamation Service immediately investigate any and all Carey land, irrigation district or like projects commenced or under construction in the arid states, and render such projects all financial and other assistance possible, to the end that they may be immediately completed and the settlers thereunder protected and assisted, and the persons holding bonds issued against said projects be compensated as far as practicable.

We urge the press of the Western states to investigate and actively support these principles.

RESOLUTIONS REAFFIRMED

We reaffirm the action taken by the Governors' Conference in Salt Lake City, Utah, in 1913, as follows:

"We, the Governors of public land states, in conference assembled believing that upon the adminstration of the laws governing the disposal of the public lands in a very large measure depends the future prosperity of our states, do hereby agree to the following statement of what we believe should be the policy of the national government in the administration of the public lands.

"1. That, the newer states having been admitted in express terms on an equal footing in all respects whatever with the original states, no realization of that condition can be attained until the state jurisdiction shall extend to all their territory, the taxing power to all their lands, and their political power and influence be thereby secured.

"2. That, as rapidly as the states become prepared to take over the work of conservation, the federal government withdraw its bureau from the field and turn the work over to the states.

"3. That permanent withdrawal of any lands within our states from entry and sale we believe to be contrary to the spirit and letter of the ordinance of 1787, the policy of which was followed for over a century, and we urge that such lands be returned to entry and opened to sale as speedily as possible.

"4. Dilatory action on the part of executive departments of the government in passing title to purchasers of public lands is unfair to the states, as it permits purchasers to occupy the lands indefinitely, without the states having power to tax them.

"5. We believe that the best development of these states depends upon the disposal of the public lands to citizens as rapidly as the laws can be complied with.

"6. Bona-fide homestead entry within the forest reserve boundaries should be permitted in the same manner as on unreserved lands, subject only to protest where lands selected are heavily timbered with trees of commercial value, or known to contain valuable mineral deposits.

"7. That the government grant to the public land states five per cent of the public land remaining in such, to be administered by the states as the school lands are now administered, for the purpose of building national public highways.

"8. That liberal land grants be made for the purpose of establishing and maintaining forestry schools in the public-land states.

"9. That rights of way for all lawful purposes be granted without unwarranted hindrance or delay.

"10. That all mineral lands now withheld from entry, or classified at prohibitive prices, be reopened to entry at nominal prices, under strict provisions against monopolization.

"11. That we express our appreciation of the splendid work done by the departments at Washington in cooperation with the several states in experimentation and instruction. This assistance has been most valuable in the education of our children and the development of our states, and we commend the same principle to the administration at Washington as being the most feasible plan for the present advancement of true conservation.

"12. We believe that the national government should provide for expert experimental work in the solution of the mining problems of the mineral states, in the same manner that the Agricultural Department assists the farmers in solving the agricultural problems.

"13. We believe that the speedy settlement of those public lands constitutes the true and best interests of the republic. The wealth and strength of the country are its land-owning population.

"14. The best and most economical development of this Western territory was accomplished under those methods in vogue when the states of the Middle West were occupied and settled. In our opinion, these methods have never been improved upon, and we advocate a return to those first principles of vested ownership with joint interest and with widely scattered individual responsibilty."

STATE VS. NATIONAL CONTROL

In 1913 this office made an investigation of the cost of reclamation projects as compared with private projects and also the cost of operation under government supervision and under private supervision, and those investigations showed that the statements made in the last report of the Census Bureau were substantially correct. The reason for making this investigation was that the Reclamation Service had caused to be published a statement to the effect that the Reclamation Projects were cheaper than those built under private enterprises. The portion of the article relating to Colorado was so obviously incorrect and even where correct was so unjust that it seemed necessary to refute the statements. To state that a thing is correct but unjust seems strange, but the selection of the private enterprises in giving the cost of construction embraced many of very small acreage and consequently high cost, and a large number were those which required expensive pumping plants, so that the averaging of the cost of these projects did not at all represent the average of actual cost on any large number of enterprises. The reason for bringing the attention of the public again to the matter herein is that even since attention was called to the errors of omission and commission in the article, its obvious injustice, and in spite of an agreement that this article should not be published any more it had appeared in some journals without the consent or approval of the Reclamation Service, but it seems that when one of these "yellow journal" articles appears anywhere, they, like Banquo's ghost "will not down." There was considerable controversy on the matter and there appeared in the Engineering News a number of articles on both sides of the question. The State Engineer of Colorado felt that none of the articles has in any way refuted his statements, nor had anything that he had stated been shown to be materially in error, so that he neither answered the articles nor acknowledged any error on his part, which he would have been glad to do had the general conclusions arrived at been materially in error, so that his final conclusions still remain good, i. e.

(1) That government enterprises cost from 25 per cent. to 50 per cent. more than private enterprises after making due allowance for interest charges paid on the private enterprises and for the maintenance paid on both the private and government enterprises.

(2) That the maintenance on the government projects is about twice what it is on private projects, and that as a general proposition the ownership of land under private irrigation system is more advantageous to the farmer, even aside from consideration of cost.

From the showing made to date on behalf of the government works, there is nothing to justify a claim of either less expense in construction or more efficiency in management. In fact, the government projects have been so expensive that it has been necessary to go before Congress and ask for an amendment to the Reclamation law extending the time of payment from ten years, as originally contemplated, to twenty years; this necessity being on account of the increased cost as determined by final figures on construction over original estimates. It was recognized that the settlers on the government projects could not meet the charges in the ten year period and that it was necessary either for the government to charge on the basis of original estimates or to extend the time of payment to twenty years.

The criticism which I would offer on the government work is that the government does many things which more properly should be done by the water users, this criticism applying both to original construction and to maintenance and operation. I think there can be no question that the water users themselves can build the small laterals and distribute the water to the individual users much more economically than can the government. This conclusion is confirmed by the fact that any corporate enterprise where the corporation attempts to build all of the small laterals and where it attempts to maintain and operate canals, has always been found to be a losing proposition, and through experience large ditch companies have learned that it is to the advantage of all concerned to have the system turned over to the users at the earliest moment possible. The charges for water at the present time on private enterprises, including irrigation districts, is from $20 to $50, except on those projects where expensive pumping plants have been necessary and the lands irrigated have been largely fruit lands. While on the government projects the costs estimated in the last annual report vary from $36.00 to $110.00, the average being about $60.00 per acre; on private projects the average is not over $35.00. The government works are, generally speaking, more substantial than the private projects, but those private projects which have been built during the last few years are well built and meet the necessities, though it is probable that as time goes on and the people under the projects become more prosperous and can better afford better and more permanent works, they will be built. In the meantime the amount saved on interest by the construction of somewhat temporary works will be such that this interest saving alone will replace the temporary works. On the other hand, many of the government works are unnecessarily expensive and have been built before sufficient data could be gathered on which the designs were based.

Control of interstate streams has been suggested by some of the Government men as a solution of interstate controversies. At this time the relative rights on interstate streams has not been judiciously determined and there is nothing that would direct the decisions and actions of such Government water official except his own private opinion, prejudiced or academic theory of what was proper. A judicial determination of the rights or priorities is necessary before an executive can act with authority and after such determination it is better to leave the matter in the hands of the local officials who are executing the local laws, regulations, decisions and adjudications. It is unwise to create a dual executive control of the streams and to move the control of local matters to Washington and put them in the hands of men probably from humid regions and where knowledge and experience is limited to the perusal of "Authorities" on the subject.

Speaking of authorities, it is strange but nevertheless true that many writers on irrigation in the United States are men who have merely a theoretical knowledge of irrigation. This is especially true of writers on irrigation law and too often the case in writings on engineering and other related subjects. Unfortunately in the past the reliability of the Government publications has not justified the high place accorded them by the general public. The influence for good and evil of the Government publications is so great and the confidence with which they are accepted should cause the heads of departments to be very careful in accepting and in publishing what their subordinates write, or in accepting reports too often influenced by "the wish being Father to the thought," by inexperience and even at times prejudice.

The general public should recognize also that the Government officials believe thoroughly in bureaucratic control, in centralization of government, and their own unprejudiced view point. It should also recognize that they are not infallible, that they desire autocratic power and to enlarge and extend their control. If any one believes that the people are incapable of local self government, that each man's business should be supervised by some official, that independent thought and actions are undesirable, that initiative is dangerous and the acquiring of experience unprofitable, then such a person will be in favor of Bureau control of all of our enterprises and in a widespread and beneficent paternalism. The proposition of Government control is based on lust of power on the one hand and is encouraged by a lack of confidence in the ability and integrity of one man in another, who is his neighbor. "A prophet is not without honor except in his own country", a piece of goods is not first class unless it is imported, nor an adviser held in much regard unless he too is "imported".

The aggression of the executive departments is merely a manifestation of what the framers of our laws and constitution foresaw and attempted to guard against by creating these coordinate branches of government, each of which would act as a check upon the other and prevent centralization of power in any one branch. The weakness of our present legislative branch and the lack of intimate contact of the judicial branch with the country as a whole has permitted the executive departments to destroy the balance of power and to become the dominant branch of the Government to such an extent that it now has the temerity to assume to interfere with the sovereign rights of the states and to assume to direct and control the States' internal affairs.

The controversies which have arisen with the Government are, in the opinion of the writer, unnecessary and should not have arisen. Eliminate the question of increasing federal power and control and substitute a desire for cooperation and a sensible solution of the mooted questions and there remains only to determine whether the use of water in Colorado will or does materially affect users lower on the interstate streams. On the Rio Grande, the Colorado and the North Platte rivers, I believe that with proper economic use there is an ample supply in each of these rivers for the irrigation of all lands susceptible of irrigation at this time, or which it will probably be profitable to irrigate during the present generation. Each of these streams can be controlled by reservoirs; The North Platte by the Pathfinder Reservoir with over a million acre feet capacity; The Rio Grande by the Engle Reservoir and the already constructed and proposed reservoirs on its headwaters, and the Colorado River by the proposed reservoirs at Kremling in Colorado, on the Grande, by the Browns Park and others on the Green, and by one said to have a five million acre ft. capacity at the junction of the Grand and Green.

The only controversy to my mind is whether users in Colorado are to be allowed to develop their systems now or whether they are to be held up until some future time when this opinion is actually demonstrated to be sound.

The constructors of projects in Colorado are so sure that there is an ample water supply for all, that they are willing to go ahead at this time, construct their works and take the order of priority to which their construction and use will entitle them. The present attitude of the Government shows that it is not willing to take its order of priority as determined by construction and use or that it is determined to curtail private enterprise and to extend unnecessarily its field of operations.

IRRIGATION LEGISLATION.

In all of the previous State Engineers' Biennial Reports suggestions have been made relative to legislation to correct inconsistencies and to eliminate from the statutes laws passed years ago and which have, to all intents and purposes, been repealed by subsequent laws, but which still remain on the statute books and create confusion in the minds of attorneys and others, especially in the minds of those attorneys outside of the State and those who are not familiar with our practices and customs. The Legislatures have shown a disposition to refuse to pass irrigation legislation. This attitude is, in my opinion, the correct one, as only such laws should be passed as are absolutely necessary. No other character of laws should be passed, especially none which would disturb our present laws and customs, most of which have already been passed upon by the State Supreme Court and are therefore permanently settled. The laws of the State of Colorado, supplemented by our Supreme Court decisions, are, in the opinion of the present Engineer (after some years of experience in Wyoming, Nebraska and New Mexico), the most workable and practical in the United States.

The most severe criticism of our laws has been against the right of transfer. Most of these writers have had little experience in the State of Colorado, and from an academic treatment, such as is generally given, their reasons seem to be sound. When one considers the tremendous development in the State of Colorado, as compared with the development in other states, and looks for the cause of the superior development in this State during practically every decade and as revealed by the reports of the Census Bureau, not even the somewhat superior climate and soil of the State accounts for the difference.

The laws of Colorado have grown gradually out of our practices, and the Supreme Court, fortunately, has had, generally, a practical view of the necessities of irrigation, principal among which is the right to the transfer of water, and it is to our laws that I attribute the success of irrigation in this State.

In the State of Colorado there has been very little control exercised by the State on irrigation projects. This condition has its advantages and its disadvantages. The State has been severely criticised for permitting the promotion of so-called "wild-cat" enterprises. Some such enterprises have been promoted, the promoters knowing them to be unsound; some have been promoted where the promoters were in good faith but were inadequately and incompetently advised; some have been promoted which were feasible, but in which there was practically no profit for the promoter, the estimates of cost being much too low, and others have been entirely feasible, but the cost of construction and management and other things have militated against the project, so that all profits were eliminated.

Generally speaking, the building of irrigation works has been in advance of the necessities and this has been true throughout the West and since almost the beginning of the construction of canals. In the late 80's and early 90's many large canals were built which are to-day a great success, the lands under them are well settled, well cultivated and a credit to the State, but the first investors often lost their money or were compelled to go without their interest for many years. A few enterprises have been profitable from the beginning. Most of the projects on which money has been spent, notwithstanding the first investment was unprofitable, have been a benefit to the State. Had the State of Colorado in its third period of development exercised the supervision which is presumed to be exercised in some of the other states, most of the projects constructed between 1880 and 1900 would not have been built.

We find in the Second Biennial Report of the State of Colorado, 1883-4, p. 32, the following:

"In 1876 the greater portion of the residents in the lower part of the Cache la Poudre Valley declared that no more new canals should be built or more water taken from the river. It is a very noticeable fact that new appropriations for canals every year have been made since 1876 from the Cache la Poudre River and yet no greater alarm exists at present as to the scarcity than was felt eight years ago."

In the Third Biennial Report, p. 57, we find the following:

"Nearly the whole of the discharge of the present season was utilized and needed for the cultivation of crops, and as there are large areas of unoccupied lands under several of the existing canals the era of beneficial canal building on this stream is probably past."

In the Fourth Biennial Report, 1887-8, p. 146, we find that the irrigated area in the Valley of the Cache la Poudre was 108,-

895 acres. The area at present actually irrigated is about 250,000 acres, and the area under canal something over 300,000 acres. From these facts and from the general attitude of the irrigators in reference to the amount of water available, it is probable that if the State had exercised its authority in determining whether or not projects were feasible, many of the canals now in successful operation in the Cache la Poudre Valley would not have been built or would have been delayed in the building for a considerable period and we would not now have the large and profitable development which is noted in the Cache la Poudre Valley. However, lack of State supervision has led to considerable financial losses and has caused irrigation projects to be discredited both in the State and abroad. It appears that the State should take some active interest in the irrigation and development and assume some control over projects, but it also appears that it is unwise for the State to assume to determine the feasibility of projects and to prohibit investment. It is the opinion of the present Engineer that all parties constructing canals or other irrigation works should be required to file with the State Engineer a complete report covering the project. This report should state the area to be irrigated, the character of the soil, the data relative to rainfall and climate, markets, transportation facilities, allied industries, crop production and water supply. The statement as to water supply should be as complete as the data available will permit. It should give the flow of the stream from which the water is to be taken, the number and capacity of all ditches taking water therefrom, the area irrigated under each of such ditches, the duty of water, the amount of water which has actually been used and an estimate of the amount available for the new project.

The State Engineer should examine this report as to its accuracy and completeness and should be permitted to require of the projectors that the report be completed and be true as to statement of fact, but the State Engineer should not be permitted to give an opinion as to the feasibility, but merely as to the correctness of the statements of fact made in the report, and it should be left to the investors and the projectors to determine whether under this statement of fact they cared to invest. It does not seem wise to place it in the power of any state official to prevent development. No law could be framed which would protect the unwise and incompetent investor which would not practically prohibit investment. It must be assumed that the investor has enough business ability to look into his investments and if not qualified himself to pass upon these matters that he should employ some one who was competent to advise him.

In this State there is a law permitting the Land Board to invest the school funds in irrigation district bonds to the extent of ten per cent. of the total issue, on those projects which have been completed. A favorable opinion must be secured from the State Engineer and from the Attorney General before such investment can be made. If the State should invest in these bonds it would in effect be an approval of the project by the State, and the State having once entered upon such investments, all irrigation districts seeking to sell bonds would be asked whether the State had purchased any of their bonds, and if the State had refused to purchase such bonds it would be equal in effect to stating that the project was not first class.

Such bonds would yield 6 per cent. to the school fund and would be as good and sufficient an investment as could be made and at the same time would be of very great benefit to the district in the placing of the balance of their issue.

The present Engineer, as Engineer of the Land Board, has hesitated to assume the responsibility of passing upon irrigation districts, realizing that if the State once began the purchase of irrigation district bonds it would have to continue to purchase at least a small amount of the bonds of each first class district; otherwise it would be very embarrassing to the projectors to have to explain why the State had refused such purchase. But it now seems to him that it is the duty of the State to exercise some supervision and to endorse those projects which are first class and to let the public know that there is a difference in irrigation enterprises—that some are safe and legitimate investments and some are not. He realizes that the responsibility assumed is very considerable and that the Land Board would be subject to all kinds of pressure and influence, but that is no reason for any longer avoiding responsibility and for not attempting to protect the investing public. The result would be that unless the projectors were certain in their own minds that they had a good and feasible project and one which would pass the scrutiny of the Land Board the project would not be attempted, with the result that few of the projects presented to the Land Board would not meet with its approval. On all projects where either land or securities are offered for sale the advertising literature should receive the approval of some state official before the same is sent out.

CHAPTER I

THE STATE ENGINEER'S OFFICE AND ITS WORK

The Nineteenth General Assembly, at both the regular and special sessions, passed no laws imposing upon the State Engineer additional duties, but by the creation of the "Highway Commission" it removed from this office the duty of supervising the expenditure of The Internal Improvement and Income Funds and placed in that commission the control of the construction of roads and bridges.

The duties of this office, therefore, are now more particularly confined to matters pertaining to irrigation and the use and control of the waters of the state.

The duties of the State Engineer were set forth in the previous Biennial Report, and it is not necessary here to repeat them. Additional work, however, fell to the office by reason of the interstate suits, two of which had already been begun, and one of which has been begun during the biennial period. The Nineteenth General Assembly appropriated fifty thousand dollars for the conduct of these suits, and a portion of that money has been expended through this office. By far the larger part of the money, however, expended by this office on these suits, has been from the appropriations of the office itself.

About one-half of the time of the Engineer has been spent on this work, and the most of the time of one deputy and about one-fourth of the time of the hydrographers is directly chargeable to these interstate suits; some of the time of the stenographers and the clerks has also been spent on this work.

In the late summer of 1913, the State Engineer, was appointed as engineer of the State Land Board and a considerable portion of his time and some of that of his assistants, has been devoted to the work of the Land Board.

The actual work on which the time, money and energies of the State Engineer's office can be classified, is as follows:

1. Office and clerical work in connection with the filing of claims to water rights.
2. Control of streams and supervision of distribution therefrom.
3. Examination of reservoir plans and specifications, supervision of dam construction and inspection of existing reservoirs.
4. Hydrographic work including measurement of stream flow and study of the water resources of the state.

5. Examination and report upon existing Carey Act projects for the benefit of the State Land Board.

6. Engineering work for other departments of the State government.

7. Work on the interstate suits.

OFFICE AND CLERICAL WORK

During the period December 1st, 1908 to November 30th, 1910, inclusive, the number of maps filed and claims for water rights was 2,751.

During the period December 1st, 1910 to November 30, 1912, inclusive, there were filed 1,820 maps, covering appropriations of water for 1,658 ditches and 763 reservoirs.

During the period December 1st, 1912 to November 30th, 1914, inclusive, there were filed 1097 maps covering appropriations of water for 1001 ditches and 300 reservoirs.

The number of filings made in the first two years was due to the fact that irrigation development was very active and there was a large influx of population, and as the making of filings was very inexpensive, as practically no fees were charged.

In the second period the decrease was due partly to a general decrease in irrigation development, and in part to the fact that the fees of this office had been very considerably increased by the act of the Eighteenth General Assembly. This increase in the fees had the effect of decreasing decidedly the number of amended maps and statements and particularly in the decrease of the amount of water claimed.

In the last biennial period the continued depression and the apparent fact that the demand for irrigated land had been fairly well supplied in previous years, practically stopped new enterprises being started, the efforts of investors being confined almost entirely to the completion of other projects, to getting them settled and cultivated and in putting them as nearly as possible on a paying basis.

SUPERVISION OF WATER DISTRIBUTION.

Details in this work are given in subsequent chapters, and in the abstracts of reports from the Water Commissioners and Division Engineers.

No material change in the method of administration or in the efficiency has been made during the biennial period.

The law relative to the maintenance of headgates and installation of measuring flumes, the placing of gages and automatic registers in reservoirs, was in part submitted to the people under the "Referendum" at the general election in the fall of 1912, resulting in the elimination of the first paragraph of section 4 as follows:

"The owner or possessor of reservoirs shall not have the right to impound water in such reservoirs during the time that such water is required in senior ditches for immediate use for direct irrigation or for storage in reservoirs holding senior rights."

The elimination of this clause had no effect whatever upon the law and water for reservoirs is now distributed strictly in accordance with the dates of priorities. It is distributed to the ditches if they have a senior appropriation and to the reservoirs if they have a senior appropriation. No irrigation season is now recognized as such but the administrative officers have tried to enforce more stringently than heretofore the law against waste and excessive use.

Extra efforts were also made to have proper headgates and rating flumes installed, especially in those districts where these necessary appliances had not been adequately provided. While a great deal has been accomplished along this line, there still remains a number of districts in the state where it will be necessary to continue the campaign for a strict compliance with the law relative to headgates and rating flumes. Although during the biennial period the amount of water available has been very satisfactory, nevertheless the construction of new reservoirs and ditches and extension of irrigated areas, has made it necessary to perfect as rapidly as possible the method of the distribution of water. The increasing use of the natural water courses, to transfer reservoir water from the reservoir to the canals has necessitated more complete information and more accurate measurements.

This is especially true in the San Luis Valley where a number of new reservoirs have been put in operation and where it has been necessary to conduct a campaign of education and to inform the owners of old ditches of the rights of the later appropriators, and especially of those who have constructed reservoirs, and effort was made during the year 1914 to have proper gages and recording devices installed at the several reservoirs. It is hoped that with the beginning of the irrigation season of 1915 that all of the reservoirs in the valley will have their devices installed and in operation.

RESERVOIR SUPERVISION.

The principal work of this nature during the biennial period has been the supervision of enlarging and repairing reservoir dams. A number of reservoirs have been built and these have been supervised and the plans submitted have received careful attention.

At the beginning of the biennial period, the engineer required that the specifications give a statement of the quantity of material going into the construction and a statement of the expenses; to give a mechanical analysis of the earth to be used in earth dams; to submit the log of test pits and borings; to submit a report of the drainage area above the reservoir and an estimate of the maximum discharge of the stream where the reservoir was located upon a stream. The removal of earth from the reservoir basin for the purpose of constructing dams, has been almost always prohibited. The placing of the valves in the center of the dam has been preferred and the construction of wood and steel outlet pipes has been discouraged.

In the placing of riprap on the dam a substantial toe at the foot of the riprap has been insisted upon and almost always a base of gravel underneath both loose rock and concrete facings has been required.

It has been necessary to return plans very often on account of both the inner and outer slopes being, in the opinion of the engineer, too steep. More adequate and a larger number of cut-off trenches underneath the dam have been insisted upon. The spillways have been required to be ample and of such a nature that they could not be obstructed.

The placing of stop planks or other impediments in the spillway has been prohibited and the structure made as nearly "fool proof" as possible.

During the biennial period a number of failures have occurred in reservoir dams. These failures have been due almost without exception to inadequate investigation of the foundations of the dam and of the materials composing it.

In some cases, while the plans made ample provision for safety, the execution of the work by the contractors was of such a nature that the resulting structure was dangerous, and the engineer was impressed with the necessity in the future of having his own representative on the ground during the entire term of construction to see that the plans and specifications were complied with and to make necessary changes in the plans and specifications during the progress of the work, as the nature of the materials encountered and other matters required.

Numerous examinations have been made of dams which have been constructed and in some instances they appeared to be dangerous. It has, unfortunately, been almost universally the case that there were no funds available for repairs and reconstruction. This condition has necessitated limiting the amount of water which could be stored in such reservoirs, and orders to withdraw a portion of the water have been issued in a number of instances.

In a number of instances reservoirs have been constructed and after completion plans and specifications have been filed with a request that they be approved. As this office had no means of ascertaining whether the specifications had been complied with and no means of making proper investigation, such requests have been refused.

During the biennial period the funds at the disposal of this office for traveling expenses have been so small it has been impossible to comply with Section 3207 Statutes of Colorado 1908 which provides that the State Engineer shall annually determine the amount of water which it is safe to store in the several reservoirs of the state. The different railroads of the state, prior to 1913 gave transportation to the irrigation officials. When the granting of these passes was discontinued and prohibited, the traveling expenses necessarily greatly increased. To remedy the lack of expense money for the deputies and also the hydrographers, the Auditing Board was requested to furnish this office with two automobiles. An examination of the expense accounts revealed the fact that the office was spending for automobile and team transportation about two hundred dollars per month, and that the service obtained was unsatisfactory as well as expensive.

The hiring of an automobile necessitates the hiring of a driver, also extra hotel and other expenses must be paid. It was the opinion of the Engineer that if the state could own its own automobiles it would eliminate the necessity of employing a driver and the engineers could run their own machines, go when and where their duties required without interference or suggestions from anyone; that if they saw fit to stop all night at any point or to return to headquarters late at night they could do so without interference.

As an experiment the Engineer purchased an automobile on his own account in 1914 and the result has been that the traveling expenses have been cut about 33%. The number of days the automobile was used very much increased and the mileage covered averaged about 100 per day or 2500 miles per month, at a cost of about one hundred twenty-five dollars per month. Based on either a per diem or mileage charge, the cost was only about one-half of what hiring the automobile would have been.

If automobiles could be provided for use, one in northeastern Colorado, one in the Arkansas Valley and one in the San Luis Valley and one in the northwest corner of the state, it is the opinion of the engineer that five hydrographers instead of seven will be sufficient and that the amount of work accomplished will be increased.

With such equipment the law relative to the examination of reservoirs each year can be easily complied with in connection with the hydrographic work. It is believed that the most practical machine for such use would be a light run-about of the Ford type and would involve the investment of about $2500 and at a cost of operation, repairs and renewals of about five cents per mile.

HYDROGRAPHIC DEPARTMENT.

A separate volume has been devoted to the work of the hydrographic department and an examination of that chapter will show the extent and work of that department.

CAREY ACT REPORTS.

In conjunction with the State Board of Land Commissioners this office has examined and reported upon all of the Carey Act segregations and projects in the state.

These examinations and reports have not led to definite results in all instances, but the fund of information at the command of the Land Board is such now that the Land Board is able to lay down a definite policy in reference to each project. Generally speaking, the projects are feasible and attractive, but it has been found that the charges per acre of water permitted on the different projects was generally in excess of what the settlers could afford to pay. The depression in the money market has almost entirely suspended the construction on the projects, and it now seems necessary to reduce the charge per acre and for the state in many instances to cancel the contracts made with the proposers and to take up the development of the projects as a state enterprise eliminating all of the speculative element and the profits which would legitimately go to the proposers should they complete the work.

The present tendency is in the reorganization to take the settlers into a mutual company where the ultimate actual cost only would be charged against the land.

WORK FOR OTHER DEPARTMENTS OF THE STATE GOVERNMENT.

Little engineering work has been done for the other departments of the state other than for the Land Board. This work has consisted of the examination of descriptions in old patents and the writing of proper descriptions for lands which have been sold.

It was found that in the past, generally speaking, the descriptions were inadequate, inaccurate and confusing, and at the request of the state engineer the Land Board now submits to his office all descriptions except those which are by strictly legal subdivisions. He thus examines all deeds where the land is described by metes and bounds for rights of way of all kinds and for those tracts which are located in townships which have been re-surveyed. This latter is a very complicated matter and has led to a great deal of confusion and unless the utmost care is exercised will in the future be the cause of much trouble and doubtless of litigation.

The Engineer during the biennial period has interested himself in state, interstate and national questions affecting irrigation and the disposition of the state and public lands, and it appears to him to be necessary that the state provide sufficient funds so that the state can be adequately represented at the Irrigation and Land Congresses.

These Congresses are often held at a distance where the traveling expenses are such that the Engineer cannot meet them personally. Matters of the greatest importance are often considered at these Congresses and a considerable amount of our difficulties has been due to the fact that in the past, the western states have not been adequately and competently represented. The departments of the government are always adequately represented and have numerous energetic and well informed delegates, The Congresses are too often made up largely of people either with a fad or theory to expound and promote, or of those who have some ulterior motive and as affecting large interests. Resolutions are adopted by those presumably representative bodies and no protest is raised on questions adversely affecting the welfare of the state.

It is suggested, therefore, that a fund be provided so that the state may be adequately represented through its officials in the next two years. A number of Congresses will be held when it will be desirable to have the Governor, Attorney General, State Engineer or the Register of the State Board of Land Commissioners present to take part in the proceedings and aid in directing and shaping the policies of the National Government and in presenting to the country, as a whole, the needs, rights and policies of the state. A campaign of education is necessary to prevent academic and, often, unwise and impractical policies from being attempted. While such policies will be abandoned as time proves their impracticability, in the interim the West is hampered in its proper development. An active interest in such Congresses by the state officers will broaden their own understanding and tend to eliminate the prejudice against state control of the natural resources.

CHAPTER II

INTERSTATE SUITS AND OTHER CONTROVERSIES.

The importance of the suits in which Colorado may become involved with other states relative to the use of water can scarcely be overestimated, each suit not only affects the stream in controversy, but any decision will necessarily have a great and direct influence upon all the interstate streams which may, in the future, be subject to litigation. The principles enunciated will be the basis probably, of later decisions and should Colorado be so unfortunate as to lose any of the earlier contests, it will detrimentally affect her growth, prosperity and development for all time.

Some of these suits are in themselves of little consequence, and the water and lands directly affected are small and therein lies the danger to the State. It is probably true that the people of the State generally do not appreciate the widespread effect of such suits, and are prone to look lightly upon the possible outcome. Should it become an established principle of law that states into which the waters of Colorado pass, have the right to demand the waters originating in Colorado, that the principle of priority, regardless of state lines, or some other adverse doctrine, should prevail, it will be a serious handicap in the development of the state. The public, while interested in the outcome of the suits and wishing the success of Colorado, are poorly informed of the consequences.

In conversation with presumably well informed citizens of the State, it has been a matter of surprise to me to learn that they were so poorly informed concerning the principles involved, the position which Colorado takes, the arguments in her favor or the terrible injustice which would be visited upon the State should the final decisions be against her. In fact, a great many citizens from reading the publications and comments originating in the other states, and from listening to addresses of visitors on this subject and, I regret to say, from reading Government publications, are inclined to believe that Colorado's contention is not tenable and that it is selfish.

It is with the purpose of correcting this impression, and of putting before the people of the State, the attitude of Colorado in this regard, that there is published in this report, a brief statement concerning the interstate suits.

One should first realize that this is a soverign state with all of the rights and privileges granted to the original thirteen states. In the original thirteen states, and in all of the other states admitted to the Union since, the natural resources within the boundaries of any state belong to that state, to be used for its development. This principle was never questioned until the so-called policy of conservation was promulgated by the bureaus of the National Government.

One should also keep in mind that the greatest natural resource in the semi-arid region is the water supply, that in the states west of the 102nd meridian, (this is a meridian a few miles east of the eastern boundary of Colorado) irrigation is not only a benefit but a vital necessity. Without it agriculture is practically impossible; without agriculture manufacturing is impossible as a practical proposition. Few of our precious metal mines, even, could be operated at a profit were it not for the fact that food products necessary to the inhabitants of the mining districts and to the livestock used in the mines, is close at hand. In fact, our first agriculture was attempted for the purpose of furnishing food and hay and grain to the mining camps. It is easy to conceive that these mines would never have been developed, even in the early day, if hay and grain, flour and vegetables could not have been grown just outside of the foot hills. It has been properly stated by one of the representatives of the Colorado Fuel and Iron Co. that their mines and their works at Pueblo would be an economic impossibility were it not for the fact that there lies adjacent to the mines and to the mills, a rich agricultural valley.

On the other hand, states lying to the east are not dependent upon irrigation, while in the extreme western portions irrigation is a benefit, agriculture is being and can be carried on by the so-called, dry farming method. East of the 100th meridian it is unprofitable, even at this time, to invest in irrigation works for the purpose of increasing the yield of the farms.

Both Kansas and Nebraska though there was not an acre of irrigated land within their borders, would still be great and prosperous states, and would continue to grow and prosper though not a drop of water should be furnished them by the Colorado streams.

In considering the just apportionment of this great natural resource between the states, one must consider whether it is vital in the case of one state and merely beneficial in the case of the other.

The states to the east, over the greater portion of their area, have rainfall sufficient for their needs, and it is not just to give those states, which have such rainfall, the right to the use of water and to take away from a state which has no rainfall, that which is essential to its very life. While we are in the habit of saying that "To him that hath it shall be given, and to him that hath not, shall be taken away, even that which he hath", it is the belief of the State of Colorado that the United States as a whole, will not sanction such an unequal distribution of the benefits which nature has provided to the different states.

The second matter which one should keep in mind is the "greatest good to the greatest number". If one could imagine the state lines being obliterated, and that the motive in determining the rights to the use of water would be to provide the greatest number of homes and to make possible the greatest production, it would necessitate the use of the water as high up on the streams as the nature of the country permitted.

In the case of Colorado before any ditches were built, it is a matter of common knowledge that as soon as the rivers left the foot hills and passed eastward into what was then known as the Great American Desert, the waters of the rivers were gradually dissipated, until they reached a point outside of the semi-arid region where the inflow from tributary streams exceeded the losses in transit. To pass the water over the sandy river beds for hundreds of miles where the winds and the heat absorbed the moisture, is not the conservation of a great natural resource. To pass water from the foothills in Colorado to the plains of western Nebraska or Kansas would involve a very great loss in transit. The early history of our state shows that the early hunters, trappers, emigrants, settlers, etc. passing up our streams, found it necessary during the summer months, to dig into the sands of the river bed to secure water for themselves and their livestock.

Had no irrigation ever been practiced in Colorado, the flow on the streams passing from Colorado into Kansas and Nebraska would have remained torrential in character, large floods in May and June and a dry river in August and September, making the practice of irrigation in those states, a very risky and unsatisfactory business.

By the use of water high up on the streams, a large part of the losses is eliminated. The productiveness of the soil on the western edge of the great plains, is equal or superior to that of western Kansas and Nebraska, so that the yield accomplished by a given quantity of water as measured at the foothills would be considerably greater if used near the foothills than it would be after the losses in transit had depleted the stream, and a less quantity of water was available. The effect of irrigation high up on the streams has been to almost eliminate the torrential floods, and has been to increase the low flow of the stream so that even in western Kansas and Nebraska the supply, while less in the aggregate for the entire year's flow, is more constant, reliable and satisfactory.

The third matter which one should keep in mind is that the State of Colorado occupies the apex of the western portion of the continent. From its mountain peaks, the rivers flow in every direction. Waters originating in Colorado reach either the Gulf of Mexico or the Gulf of California. To the north the Laramie and the North Platte River flow into the State of Wyoming, to the west the Bear or Yampa, the White, the Grand and the Dolores flow in to the state of Utah, to the south the San Juan and its tributaries and the Rio Grande flow into New

Mexico, and to the east the Arkansas flows into Kansas, and the Republican and the South Platte into the State of Nebraska. The aggregate discharge of these streams into the adjoining states, at the present time, after all of the irrigated lands have been supplied with water, amounts to nearly 13,000,000 acre feet per annum, an amount sufficient probably by reason of re-use and return seepage, to irrigate 13,000,000 acres of land, or four times the present irrigated area of the state.

Unfortunately, the topography of Colorado is such that only a small proportion of this water which now flows into other states, can ever be used within the boundaries of Colorado.

There is little irrigable land in Colorado on the North Platte River, there is comparatively little on the western slope where the largest amount of water flows; with the exception of the San Luis Valley there is little irrigable land in the southern part of the state, although there is an abundant water supply. East of the Continental Divide alone does the amount of irrigable land exceed the water supply, and even here after a development of fifty years, there still passes on the average, into the state of Kansas through the Arkansas River over 300,000 acre feet per annum; and on the South Platte River over 300,000 acre feet per annum passes into the State of Nebraska.

The larger part of this water which now enters these two states, cannot profitably be used in the State of Colorado, for the reason that it is largely seepage return water and any ditch constructed to make use of this water would of necessity pass into the states of Kansas and Nebraska to obtain land upon which it might be utilized.

It does not seem unjust, in view of the fact that so small a proportion of the water will be used, that the State of Colorado be permitted to use all of the water in the streams that it can use.

One should also keep in mind the fact that under irrigation the returns now obtained justify the most careful conservation of the water supply, and that on account of the wonderful climate and the benefits derived by reason of that climate, justifies the creation of as many homes as possible in the state. In this regard it appears, therefore, to be for the greatest good of a greatest number of people, that the state become populous and highly developed, where health can be conserved, homes built and wealth created.

It is entirely too narrow a conception of these interstate cases to consider merely priority or right to use the water. The question must be considered as between sovereign states and not between individuals of the states and their individual rights.

The interstate suits relative to the use of water on the interstate streams has formed the most important part of the work of this office for the biennial period. The time of the Engineer, of one of his deputies and of the hydrographers has been largely devoted to the preparation of suits already begun, and for those which were even remotely probable.

In the case of the possible suits which may arise in the future, this office has endeavored to gather data concerning the stream flow, use of water, areas irrigated, searching out witnesses and in the securing of other miscellaneous information.

In the suits that have already been brought, all available data has been gathered, and the particular case studied in detail. The practices in other states and in other countries have been studied, and it has been the attempt of this office to present as completely as the time at our disposal allowed, as full and detailed information as possible, and to present it in as concise a form as the nature of the subjects permitted.

The suits on trial during the biennial term were three in number:

First—The State of Wyoming, Complainant, vs. the State of Colorado, The Greeley-Poudre Irrigation District and the Laramie-Poudre Reservoir and Irrigation Company, Defendants.

This suit was brought in the Supreme Court of the United States.

Second—The United States Irrigation Company vs. The Graham Ditch Company et al., in the United States District Court.

This is a renewal of the original Colorado-Kansas case, the principle difference being that in the first case it was between the two states and in the present case it is between ditch companies and individuals.

The same questions are involved as in the first suit, though the users in Colorado claim that as to those ditches in operation before the original Colorado-Kansas case was brought, the Supreme Court of the United States decided the question in so far as they were concerned and their status is "res adjudicata".

Third—The Pioneer Irrigation Company vs. Field, et al. This case is brought in the United States District Court to prevent the water officials from distributing the waters of the North Fork of the Republican to canals in Colorado in accordance with the Colorado decrees, and to force the closing of canals in Colorado so that lands in Nebraska may be supplied.

The suits in prospect are:

First—The rights of Colorado to divert waters of the North Platte River which might possibly affect the use of water under the Government North Platte Project in Wyoming and Nebraska.

Second—The right of persons in Colorado to construct reservoirs and canals on the headgates of the Rio Grande in Colorado which might possibly affect the use of water under the Government Rio Grande Project in southern New Mexico and Texas.

Third—The right of Colorado to divert water from the streams tributary to the Colorado River possibly affecting proposed projects on the lower Colorado River in southeastern Arizona in the vicinity of Yuma and in California in the Imperial Valley and in northern Mexico.

This possible case may involve also; the right of Colorado users to divert water across the Continental Divide from the headwaters of the tributaries of the Grand River to the watersheds of the Arkansas and South Platte Rivers.

Wyoming vs. Colorado:

In the Colorado-Wyoming case, Wyoming presented its evidence first. This evidence was to the effect that there was a scarcity of water in the Laramie River, not only for the areas which it was proposed to irrigate, but at times, for areas already irrigated. That there were periods when ditches with decrees older than the Laramie-Poudre diversion, were not supplied.

Their evidence also showed that good crops could be grown on the Laramie Plains and on the Wheatland Project. That these farming enterprises in combination with stock raising, was a valuable industry and produced considerable returns.

Their evidence also tended to show that the diversion of water through the tunnel from the Laramie to the Cache la Poudre River, would so deplete the stream as to jeopardize projects already constructed.

Considerable evidence was submitted relative to the dates of construction of canals and time of use of the water.

Wyoming also contends that the owners of lands in Wyoming have a riparian right, and claim that without water the lands would be valueless.

The evidence submitted by Colorado showed that there were about 500,000 acre feet of water on the average per annum flowing in the Laramie River and its tributaries, and that about half of this amount originated in the State of Colorado.

The evidence also showed that the ultimate possible use of water in Colorado on account of the peculiar topographical features, could not exceed one-third of the waters originating in Colorado. That even with the extension of the proposed Laramie-Poudre project to include the diversion of all of the possible waters of the Laramie River, only about one-third of that which, in its natural condition, crosses the state line could be diverted. A diversion of this one-third of the supply included the diversions of existing canals, the Skyline Canal and Sand Creek diversion; and that of the total supply of the stream Colorado would only be able to use about one-fifth, while there would be available for Wyoming about four-fifths, and that such a proportionate division of the benefits would not be unjust to Wyoming.

Wyoming contends that the diversion of water from one watershed to another is illegal, and that the waters of any drainage area if needed, should be used only in that drainage area.

The evidence on behalf of Colorado showed that there were a great many diversions in the State of Wyoming from one watershed to another. Also, that in every country where irrigation was practiced such diversions were made. That in India, water was taken from the Ganges to the Indus and from the Indus to the Ganges. That in Italy water was diverted from one watershed to another; also in France water was diverted from one watershed where there was an ample amount of land to use all of the water, it has been transferred to another watershed for use therein. That the same practice obtained in the Hawaiian Islands and in all of the irrigation states of the United States. That water was taken from the watershed of the Missouri and put into the watershed leading to Hudson Bay. That the Government had diverted water from the Pacific Slope onto lands in Nevada into a basin which had no outlet. That the City of Los Angeles had transferred water from one watershed to another. That the Government had diverted water from the Gunnison River to the Uncompahgre. That it had changed water from one watershed to another on the Sunnyside Project. In short, that there was no law or prohibition in any irrigated country preventing the transfer of water from one watershed to another, that it was merely an economic condition, and where such diversions were made, it was merely a matter of priority of right and whether it was feasible financially to go to the expense of making such diversions.

The evidence in behalf of Colorado also showed that although the Laramie Plains were much older in point of settlement than the lands in the Cache la Poudre Valley, and though the Laramie Plains had earlier railroad facilities and earlier settlements, the development had progressed very slowly, if at all. While in the Valley of the Cache la Poudre there has been a large and constant increase in population, the area irrigated, the value of crops and the assessed valuation.

The evidence also showed that in the Valley of the Cache la Poudre, the crop returns per acre were several times that of the Laramie Plains and much larger than that of Wheatland.

The evidence also showed that in economy of use and in the benefits derived from the use of water, the Cache la Poudre Valley showed that the same quantities of water applied to the land produced much greater return, and that it was not for the greatest good to the general public that water should be used on inferior lands where little other than feed for cattle could be produced, in preference to its use on the highly productive lands of Colorado. That a proper conservation of this natural resource and the making of homes for the greatest number of people required that the water be diverted from the Laramie River to the Cache la Poudre.

The evidence of Colorado also showed that even after the diversion of the maximum possible amount from the Laramie River to the Cache la Poudre there was still an ample supply for all of the lands in Wyoming which could profitably be put under irrigation. That under the present practice in Wyoming the use was wasteful and uneconomical.

Colorado contended that for Wyoming to ask that water be sent down from Colorado that she be required first to exercise diligence in the conservation and utilization of what water was available from the Wyoming areas. That with proper administration and with the proper reservoiring of the water no scarcity would be felt on the Wyoming lands.

The evidence of Colorado also showed that the date of priority of the diversion of the water was earlier than that of the large projects in Wyoming, and that even should the "priority of use" doctrine prevail, these new projects could not demand the water from Colorado.

The evidence also went to show that on the Laramie Plains the raising of stock to be fattened elsewhere was at the present time, at least, the only profitable branch of farm operation, and that the highest utilization of the lands of the Laramie Plains was for range purposes.

The taking of the evidence in this case was completed about April first 1914 and the case will probably be argued early in 1915 before the Supreme Court of the United States.

The present Colorado-Kansas case has been progressing for some three years. All of the evidence has not yet been taken although the taking of the testimony has been almost continuous during that period.

The Republican River case known as the Pioneer Irrigation Co. vs. Field, et al., is a suit brought by the Pioneer Irrigation Company against the water officials of the state and against the users of water on the Republican River in Colorado. This case came to trial in the United States District Court, the contention of the Pioneer Irrigation Company being that it has a priority of right over some of the canals in Colorado, that it had beneficially used the water as far as possible but were prevented from the use of water under their priority by reason of diversions in Colorado, and that for that reason all of the lands under the line of the canal had not always received water, and that this diversion by the Colorado canals had prevented the proper development of the lands in Nebraska.

The Pioneer Irrigation Company has two decrees, one from Colorado for 15 cubic feet per second, for the irrigation of lands in Colorado and one for 77 feet from the State of Nebraska, for the use of water on the lands in that state.

Nebraska,also showed the capacity of the canal near its headgate to be about 70 cubic feet per second and at the state line about 35 cubic feet per second. It showed the irrigated areas in both Colorado and Nebraska, claiming some 2300 acres in the latter state. When Colorado attempted to present its side of the case they were limited to a showing of the capacity of the canal and were not permitted to show the irrigated area, the duty of water or other matters which it conceived to have a bearing upon the case. The Judge decided that Nebraska should have an amount of water at the state line equal to the capacity of its canal, and arrived at this figure by taking the capacity shown by one of the witnesses for Colorado, and one of the witnesses for Nebraska, and averaging them, arriving at the figure of 29 cubic feet per second, a little over one-third of the amount of the Nebraska decree of 77 feet.

Colorado desired to show that by the use of water high up on the stream a greater benefit is derived and that the return waters would supply all of the needs of the Pioneer Canal. That there was comparatively a small acreage under the Pioneer Canal in Nebraska which had been irrigated until the last few years. That diligence in the application of water had not been sufficient, and that the Pioneer Canal in its lower portion was never completed and that a large portion had been abandoned. That those ditches which were built subsequent to the Pioneer Canal were built because the builders realized that little water had been used or would be needed for the Pioneer Canal, and that there was water in the river for these newer ditches under the conditions existing at the time of construction.

Colorado desired to show that the water of the Republican River if left in its natural condition, increases the inflow to a point near the Town of Wray, and that from this point eastward the losses were very great. But that the inflow reached the State of Nebraska and served the purpose of irrigation of the meadow lands along the stream.

Colorado contended that as a sovereign state, it owned and controlled all of the water within its borders. And it desired to show that the use of water was a necessity in Colorado, while in Nebraska it is merely beneficial.

The suit will probably be carried to the higher courts and those representing Colorado are confident that the final decision will be favorable to the State.

Other prospective suits. It is believed that no development in Colorado will ever detrimentally affect either the state of Wyoming or Nebraska, as far as the use of the water of the North Platte River is concerned and it is believed to be true that with the control of the North Platte River by reason of the already constructed Pathfinder Reservoir, that there is not enough irrigable land along the borders of the North Platte River, in both the State of Wyoming and the State of Nebraska, to utilize all of the water of that stream. The flow of the North Platte River is about two million acre feet per annum, an amount about twice as great as that of the South Platte. On the South Platte and its tributaries about one million acres are irrigated. The supply of the North Platte, therefore, should be sufficient for two million acres.

The irrigable lands below the Pathfinder Reservoir while large in quantity were much less than two million acres, and are about as follows:

Above the headgates of the Goshen Hole Canal and the Laramie Canal about 50,000 acres, this area being in segregated tracts between the town of Casper and the town of Guernsey;

Under the Goshen Hole and Laramie Canal projects, 200,000 acres;

Under the Interstate Canal, as originally designed, 160,000 acres;

Under all other canals in Nebraska to a point twenty miles below the town of Bridgeport, 100,000 acres.

So that it appears only some 500,000 acres will ever be irrigated from the North Platte River below the Pathfinder Reservoir, only one-fourth as much as the river is capable of serving. Indeed, it is believed to be true that the return seepage water from the canals heading above the town of Scotts Bluff, Nebraska, in both Wyoming and Nebraska will be such that it will never be necessary to pass water over the Interstate Canal diversion dam for canals heading below Scottsbluff.

The return seepage on the North Platte River is very great in Nebraska, and probably at least equal in the percentage of return to the South Platte River in Colorado, which seepage return has been variously estimated at from thirty to sixty per cent of the amount diverted. It is believed that the prohibition of the development of projects in the North Park in Colorado above the Pathfinder Dam in Wyoming is unreasonable, and not based at all upon the necessities of the lands below the Pathfinder. In this case it appears to be unnecessary to go into the matter of interstate rights but that a proper examination and analysis of the flow of the North Platte River and the irrigable land along it, will prove that there is and always will be a surplus of water in the North Platte River or at least until such time as the value of lands and crops will justify the extension of the Goshen Hole Canal to the lands lying between Pole Creek and the North Platte River, and east of the line of the Burlington Railroad between Sidney and Bridgeport, Nebraska. This canal would have a total length of some three hundred and fifty miles, and pass for a considerable portion of its length through a sandy hilly country where the losses from seepage would be very large. If such a canal is ever constructed it will have to be lined to prevent this seepage. The cost of the construction of such a canal so lined is prohibitive.

The contention upon the Rio Grande in relative to the storage and use of water on the headwaters of the Rio Grande in northern New Mexico and in Colorado, which right is now denied by the U. S. Government.

In this case it is contended that the use of water high up on the stream is the proper use; that the sending of water from

Colorado for storage in the Engle Dam, a distance of 250 miles, involves enormous losses from evaporation in transit.

That the return seepage waters from the areas irrigated in the San Luis Valley will augment the low flow of the stream and that when the drainage canals now proposed are constructed the returns to the river will be nearly as great as they have been found to be on the South Platte River.

In this case there is involved an international question, the United States having made a treaty with Mexico, guaranteeing the delivery of 60,000 acre feet of water to lands in Mexico near the town of El Paso.

With this treaty as a basis of the necessity of the construction of the Engle Dam the project was enlarged so that the proposed Engle Dam as at present designed and being built, will contain some two million seven hundred thousand acre feet of water with an annual average delivery of 700,000 acre feet. We thus see that the project has been extended to more than eleven times the necessities on account of the Mexican treaty. In effect a right and priority to the use of water is sought to be acquired by the land in southern New Mexico and Texas as of the same date as for the land in Old Mexico, which will receive the sixty thousand acre feet of water. This procedure attempts to place the priorities for such lands ahead of not only the present developments in Colorado, but also on those which were attempted but prohibited by the Secretary of the Interior.

Colorado feels in this case that it is uneconomical and is not a conservation of this natural resource to force the water to flow from the boundary of Colorado to the vicinity of El Paso, Texas, involving as it does enormous losses. It has been estimated that such losses will probably be as great as 75% of the amount crossing the Colorado boundary line.

The construction of reservoirs in Colorado is for supplemental use, that is, to supplement the water supply of existing ditches during the period of low flow. One acre foot of stored water will supplement a supply for probably two acres of land. One acre foot of water passing the boundary line of Colorado would probably mean one-quarter of an acre foot delivered at El Paso. In other words, eight acres of land in Colorado must be deprived of their supplemental supply to deliver one-quarter of an acre foot at El Paso. It has been stated by some interested in the El Paso Project that three acre feet per acre per annum are necessary. Therefore, this one-quarter acre foot of water would irrigate about one-twelfth of an acre of land near El Paso, and although the returns per acre near El Paso may be greater than those in Colorado there is no such discrepancy in the productiveness as there is in the amount of water consumed. Even should this quarter acre foot of water be considered as a supplemental supply at El Paso and sufficient for one-half an acre, four acres in Colorado would be deprived of its supplemental supply to furnish supplemental supply for one acre at El Paso.

Furthermore, if this water is conserved in Colorado and used, the return seepage waters will return a large portion of the stored water to the stream through the drainage canals.

Major Powell for years the Director of the Geological Survey made a particular study of this question. Quoting from Water Supply Paper No. 240, Page 15, Mr. Siebenthal says:

"Major Powell urged that the tributaries of the Rio Grande below the Colorado-New Mexico line would, if the waters were conserved, furnish a sufficient flow to maintain the irrigation of that section as then developed. He pointed out that when the river emerges from the Valley at the foot of Embudo Canon, it is a fine stream and must always be so whatever water is taken out in Colorado above."

Mr. Siebenthal further says:

"The table on Page 20 giving the comparative acreage irrigated from the Rio Grande and its tributaries in 1889-1890 shows an increase in that period of over 100%, yet the discharge of the Rio Grande at Embudo shows no corresponding systematic diminution during the irrigating months, notwithstanding that the water is almost wholly removed from the river in its course through the valley, as shown by the gage at the State Bridge.

* * * * * * * * * * *

The sands and gravels of the San Luis Valley act as a natural reservoir with lasting benefit to the Rio Grande Valley below."

The right of Colorado users to divert water from the streams tributary to the Colorado River and to carry the water across the Continental Divide has been questioned. Any equitable division of the benefits to be derived could not deprive Colorado of what water she needs on account of the limited area irrigable in the Colorado River drainage in Colorado, and the right to divert across the Continental Divide cannot be questioned because it is a universal practice, not only in the United States but throughout the world wherever irrigation is practiced.

CHAPTER III

FINANCIAL

The Nineteenth General Assembly made appropriations for the State Engineer's office as follows:

	1913	1914
State Engineer's Salary	$3000	$3000
2 Deputy Engineers' Salary	3600	3600
Travelling and Contingent Expenses of Engineer and Deputies for biennial period		4200
Draftsman, Salary	1500	1500
Chief Hydrographer, Salary	1800	1800
Six Hydrographers at $125 per month	9000	9000
Stenographic services	1095	1620
Clerk, Salary	1200	1200
File Clerk, Salary	1200	1200
Incidental Expenses	1500	1500
Travelling Expense Hydrographers	3000	3000
Irrigation Division Engineers:		
Division No. 1	2500	2500
Division No. 2	2500	2500
Division No. 3	1500	1500
Division No. 4	1500	1500
Division No. 5	1500	1500
Travelling Expenses of Five Division Engineers	2500	2500
For Office Equipment Division No. 4		150
Total for Biennial Period of 1913-1914	$82,665	

From these appropriations balances were left in the various funds as follows:

	1913-14
Travelling and Contingent Expense Engineer and Deputies	$ 962.62
Deputies Salary	300.
Stenographic Services	520.
Incidental Expense	260.38
Travelling Expense, Hydrographers	642.30
Travelling Expense Five Division Engineers	554.09
Hydrographic Salary Fund	141.67
Total	$3381.06

This leaves the amount expended in 1913-14, for the administration of the State Engineer's office and for the service of water distribution in the State, exclusive of Water Commissioners' salaries, $79,283.94.

As a credit against this amount, this office has received and transmitted in 1913-14 to the State Treasurer, $25,404.73.

This makes a running cost, including the Division Engineers (but excluding water commissioners, who are paid by the counties) of $53,879.21.

Following is a detailed statement in tabular form of receipts and expenditures to and from each of the various funds handled through this office:

STATE ENGINEER'S SALARY FUND.

	1913	1913	1914	1914
Appropriated		$3000.00		$3000.00
C. W. Comstock	$1000.00			
John E. Field	2000.00		$3000.00	
	3000.00	3000.00	3000.00	3000.00

DEPUTIES, STATE ENGINEER—SALARIES.

	1913	1913	1914	1914
Appropriated		$3600.00		$3600.00
A. F. Hewitt	$2085.00		$2052.00	
J. W. Johnson	360.00			
R. I. Meeker			1098.00	
E. C. McAnelly	1155.00		150.00	
Balance			300.00	
	3600.00	3600.00	3600.00	3600.00

TRAVELING AND CONTINGENT EXPENSE, ENGINEER AND DEPUTIES, FOR THE BIENNIAL PERIOD.

	1913	1914	1913-1914
Appropriated			4200.00
Expended in 1913		1104.82	
C. W. Comstock	36.70		
A. F. Hewitt	176.40	79 49	
J. W. Johnson	6.20		
John E. Field	518.47	637.00	
E. C. McAnelly	233.05		
M. E. Bunger (Auto Livery)	134 00		
R. I. Meeker		803 46	
Miscellaneous		612.81	
Balance	3095.18	962.42	
Total	4200.00	4200.00	4200.00

DRAFTSMAN, SALARY FUND.

	1913	1913	1914	1914
Appropriated		1500.00		1500.00
O. L. Nelson	1500.00		1500.00	
	1500.00	1500.00	1500.00	1500.00

CHIEF HYDROGRAPHER, SALARY FUND.

	1913	1913	1914	1914
Appropriated		1800.00		1800.00
Thos. Grieve, Jr.	1800.00		1800.00	
	1800.00	1800.00	1800.00	1800.00

HYDROGRAPHERS, SALARY FUND.

	1913	1913	1914	1914
Appropriated		9000.00		9000.00
M. E. Bunger	1500.00		1500.00	
D. L. Bundy	1500.00		1500.00	
C. L. Chatfield	1500.00		1500.00	
B. S. Clayton	1500.00		500.00	
C. O. Crisman	895.83		1250.00	
C. C. Hesmalhalch	1500.00		1500.00	
Geo. P. Woodhall			875.00	
C. E. Turner	587.50			
H. D. Amsley			250.00	
Balance	16.67		125.00	
	9000.00	9000.00	9000.00	9000.00

STENOGRAPHIC SERVICES FUND.

	1913	1913	1914	1914
Appropriated		1095.00		1620.00
Mary W. Dargin	433.35			
Anna O. Finch			500.00	
L. D. Smith	661.67		600.00	
Balance			520.00	
	1095.00	1095.00	1620.00	1620 00

CLERKS, SALARY FUND.

	1913	1913	1914	1914
Appropriated		1200.00		1200.00
E. H. Rhodes	433.33			
May A. Bradford			1066.67	
Mary W. Dargin	766 67		133.33	
	1200.00	1200.00	1200.00	1200.00

FILE CLERKS, SALARY FUND.

	1913	1913	1914	1914
Appropriated		1200.00		1200.00
J. H. Bradley	433.33			
E. H. Rhodes	766.67		1200.00	
	1200.00	1200.00	1200.00	1200.00

INCIDENTAL EXPENSE FUND.

	1913	1913	1914	1914
Appropriated		1500.00		1500.00
Salaries, Gage Readers	1215 65		1461.97	
Bristol Automatic Gage	62.00			
Balance	222.35		38.03	
	1500.00	1500.00	1500.00	1500 00

TRAVELING EXPENSE OF SIX HYDROGRAPHERS.

	1913	1913	1914	1914
Appropriated		3000.00		3000.00
M. E. Bunger	335.34		557.70	
D. L. Bundy	298.00		357.22	
C. L. Chatfield	626.25		413.55	
B. S. Clayton	499.01		123 45	
C. O. Crisman	309.50		432.45	
C. C. Hezmalhalch	53.26		144.40	
C. E. Turner	303.15			
Thos. Grieve, Jr.	396.50		398.85	
H. D. Amsley			109.07	
Balance	178.99		463.31	
	3000.00	3000.00	3000.00	3000.00

DIVISION ENGINEER SALARY, DIVISION NO. 1.

	1913	1913	1914	1914
Appropriated	....	2500.00	....	2500.00
F. Cogswell	2500.00	....	2500.00	....
	2500.00	2500.00	2500.00	2500.00

DIVISION ENGINEER SALARY, DIVISION NO. 2.

	1913	1913	1914	1914
Appropriated	....	2500.00	....	2500.00
E. R. Chew	2500.00	....	2500.00	....
	2500.00	2500.00	2500.00	2500.00

DIVISION ENGINEER SALARY, DIVISION NO. 3.

	1913	1913	1914	1914
Appropriated	....	1500.00	....	1500.00
F. W. Swanson	1500.00	....	1500.00	....
	1500.00	1500.00	1500.00	1500.00

DVISION ENGINEER SALARY, DIVISION NO. 4.

	1913	1913	1914	1914
Appropriated	....	1500.00	....	1500.00
H. C. Getty	1500.00	....	1500.00	....
	1500.00	1500.00	1500.00	1500.00

DIVISION ENGINEER SALARY, DIVISION NO. 5.

	1913	1913	1914	1914
Appropriated	....	1500.00	....	1500.00
Theo. Rosenberg	1500.00	....	1500.00	....
	1500.00	1500.00	1500.00	1500.00

DIVISION ENGINEER EXPENSE FUND.

	1913	1913	1914	1914
Appropriated	....	2500.00	....	2500.00
F. Cogswell, Eng. Div. No. 1	499.99	....	499.99	....
E. R. Chew, Eng. Div. No. 2	533.35	....	500.00	....
F. W. Swanson, Eng. Div. No. 3	389.65	....	320.75	....
H. C. Getty, Eng. Div. No. 4	499.40	....	463.60	....
Theo. Rosenberg, Eng. Div. No. 5	356.55	....	382.63	....
Balance	221.06	....	333.03	....
	2500.00	2500.00	2500.00	2500.00

OFFICE EQUIPMENT, DIVISION NO. 4.

	1913	1914	1913-14
Appropriated	....	....	150.00
Expended in 1913	....	75.00	....
J. D. Volkenburg, Typewriter	75.00	....	....
H. C. Getty	....	75.00	....
Balance	75.00	....	....
	150.00	150.00	150.00

DISTRIBUTION OF FEES RECEIVED IN STATE ENGINEER'S OFFICE. DECEMBER 1, 1912, TO NOVEMBER 30, 1914, INCLUSIVE.

	Dec. 1st, 1912 Nov. 30, 1913	Dec. 1, 1913 Nov. 30, 1914	Total 1913-14
Filing claims to water rights	14847.00	6727.00	21574.00
Rating Ditches (Gaging)	192.45	87.85	280.30
Postage	26.15	9.25	35.40
Blue Prints	519.73	635.70	1155.43
Certificates and certifications	372.00	290.00	662.00
Sale of Irrigation Law	41.00	41.00	82.00
Office Labor	74.50	37.00	111.50
Examination of Reservoir Plans	287.00	987.00	1274.00
Filing of Transfer Decrees	50.00	24.00	74.00
Examination of Dams	29.20	30.00	59.20
Incidental sale of old cable	....	85.00	85.00
Field Books	11.90	....	11.90
	16450.93	8953.80	25404.73

CHAPTER IV

REPORTS OF DIVISION ENGINEERS

STATE OF COLORADO
IRRIGATION DIVISION NO. 1
DENVER

Denver, Colo., Nov. 30, 1913.

Mr. John E. Field,
State Engineer,
Denver, Colorado.

Dear Sir: As provided for in Section 12, Chapter 125, Page 287, Session Laws of 1903, I herewith submit a report of the work of this irrigation division during the fiscal year ending November 30, 1913.

There has been no serious trouble over the distribution of water, although there was a shortage of water in the South Platte water-shed during May, June, July, August and September.

Only one appeal, during 1913, has been taken from rulings of this office to the Courts. On May 2nd, the Pioneer Irrigation Company owners of the Haigler Land and Canal Company's Ditch in District No. 65, made a verbal request for a ruling relative to the distribution of water from the Republican River to their ditch under its decree issued by a District Court of Nebraska.

They were informed that this office would distribute water to the ditch in accordance with the Colorado decree, but could not recognize the Nebraska decree. This question is now pending in the United States District Court, District of Colorado.

The annual appeal of District No. 3, from orders of this office relative to the storage of water, was received on October 7th. The standard charge that there was a discrimination against District No. 3, in the distribution of water by this office, was not omitted.

The State Engineer ruled that the complaint was not justified.

On April 9th, 1913, in compliance with your instructions of April 8th, a circular letter was sent to all the Water Commissioners in this division, instructing them to place on the headgates of all their decreed ditches, the name of the ditch; the priority numbers of the appropriations decreed to each ditch and the numbers of the transferred appropriations.

The first demand for water, for direct irrigation, was received on May 22nd, for 130 second-feet to supply ditches in District No. 2, antedating July 9, 1879. On May 24th, this demand was increased to 301 second-feet to supply appropriations of earlier date than January 1, 1879. On the same date a demand was received for 600 second-feet to supply the Highline Canal in District No. 8, on its appropriation of date Jan. 18, 1879.

The use of water for direct irrigation, in districts Nos. 3, 4 and 5, ceased about Oct. 4th and storage was commenced in decreed reservoirs with appropriations of earlier date than Jan. 1, 1893.

On October 10th, 1913, a general order was sent to the Water Commissioners in Districts Nos. 2, 3, 4, 5, 6, 7, 8, 9 and 23, allowing storage of water in any decreed reservoir.

On Nov. 7, 1913, this order was extended to also include storage in undecreed reservoirs, with appropriations of an earlier date than January 1, 1906.

Since November 1st, only ditches in Districts Nos. 1, 2 and 64 have used water for direct irrigation. The following tables are compiled from the weekly reports of the Water Commissioners, as they give the information most often asked for, except in special cases when more detailed and specific data are required:

THE WEEKLY REPORTS OF THE WATER COMMISSIONERS SHOW THE FOLLOWING DATES OF PRIORITIES OF LATEST DITCHES DRAWING WATER FOR DIRECT IRRIGATION IN DISTRICTS 1 TO 9 AND 64, DURING 1913.

Date, Saturday	No. 1	Upper No. 2	Lower No. 2	No. 3	No. 4	No. 5	No. 6	No. 7	No. 8	No. 9	Upper No. 64
Apr. 5	All Ditches						No Report		No Report		
Apr. 12	All Ditches		See Note	Below			No Report		No Report		
Apr. 19	All Ditches						No Report		No Report		
Apr. 26	All Ditches	July 1892					No Report	All Ditches	No Report		
May 3	All Ditches	July 1892	Dec. 1874	All Ditches			Dec. 1873	All Ditches	No Report	All Ditches	
May 10	All Ditches	July 1892	Nov. 1874	All Ditches	July 1881		Feb. 1888	All Ditches	Jan. 1879	All Ditches	All Ditches
May 17	All Ditches	July 1892	Dec. 1874	All Ditches	Feb. 1878	All Ditches	June 1885	All Ditches	Jan. 1879	All Ditches	All Ditches
May 24	June 1887	May 1865	Dec. 1874	April 1881	Oct. 1881	All Ditches	Feb. 1888	Nov. 1877	Jan. 1879	May 1874	All Ditches
May 31	Sept. 1882	May 1865	Nov. 1877	April 1881	Dec. 1880	All Ditches	Feb. 1888	Mar. 1878	Mar. 1868	Mar. 1869	June 1882
June 7	June 1882	Nov. 1885	July 1879	Sept. 1878	July 1881	All Ditches	May 1870	Dec. 1874	Jan. 1879	May 1871	June 1882
June 14	June 1882	July 1876	July 1879	Nov. 1874	June 1866	May 1878	May 1870	Dec. 1874	Jan. 1879	May 1871	June 1882
June 21	June 1882	Nov. 1885	July 1879	Nov. 1874	June 1866	Sept. 1884	May 1870	June 1883	Mar. 1868	Dec. 1882	June 1882
June 28	June 1882	July 1876	Dec. 1874	April 1873	June 1866	Mar. 1872	May 1870	Mar. 1873	Mar. 1868	May 1871	June 1882
July 5	June 1882	May 1865	Nov. 1874	April 1871	June 1866	Mar. 1872	Feb. 1865	Feb. 1871	Nov. 1873	Oct. 1864	June 1882
July 12	June 1882	May 1865	Nov. 1874	Oct. 1870	Nov. 1865	Mar. 1872	June 1863	Nov. 1865	Mar. 1868	Oct. 1864	June 1882
July 19	June 1882	July 1876	Nov. 1877	Nov. 1872	Nov. 1865	May 1878	June 1865	Dec. 1874	Jan. 1879	May 1871	June 1882
July 26	Oct. 1882	Nov. 1885	July 1879	April 1870	Nov. 1865	Sept. 1884	April 1872	Nov. 1878	Jan. 1879	Dec. 1882	June 1884
Aug. 2	Sept. 1882	May 1865	Nov. 1874	Oct. 1870	Nov. 1865	Mar. 1872	? 1872	April 1872	Nov. 1873	May 1871	June 1882
Aug. 9	June 1882	May 1865	Nov. 1874	May 1869	Nov. 1865	Mar. 1872	June 1862	Feb. 1871	Mar. 1868	Oct. 1865	June 1882

Aug. 16	Oct. 1881	May 1865	Nov. 1874	May 1869	Nov. 1865	Mar. 1872	May 1863	Feb. 1865	Mar. 1868	Mar. 1863	Sept. 1873
Aug. 23	Oct. 1881	May 1865	Nov. 1874	April 1867	Nov. 1865	Mar. 1872	May 1862	Feb. 1865	Mar. 1868	Oct. 1865	Sept. 1873
Aug. 30	Oct. 1881	May 1865	Nov. 1874	April 1867	Nov. 1865	Mar. 1872	May 1862	Nov. 1863	Mar. 1868	Oct. 1865	Oct. 1880
Sept. 6	June 1882	May 1865	Nov. 1874	April 1867	Nov. 1865	Mar. 1872	May 1862	Mar. 1865	Mar. 1868	May 1871	Oct. 1880
Sept. 13	Sept. 1882	May 1865	July 1879	Oct. 1870	Nov. 1865	May 1878	April 1865	April 1872	Jan. 1879	May 1871	Sept. 1894
Sept. 20	April 1883	Nov. 1885	July 1870	All Ditches	Nov. 1885	Mar. 1872	Nov. 1873	April 1871	Jan. 1879	Mar. 1882	Sept. 1894
Sept. 27	June 1887	Nov. 1885	Nov. 1874	All Ditches	July 1881	Mar. 1872	Nov. 1873	Nov. 1881	Jan. 1879	Dec. 1882	Sept. 1894
Oct. 4	All Ditches	Nov. 1885	Nov. 1874				All Ditches	Nov. 1881	Jan. 1879	Dec. 1882	All Ditches
Oct. 11	All Ditches	Nov. 1885	Nov. 1874				All Ditches	All Ditches	Jan. 1879	All Ditches	All Ditches
Oct. 18	All Ditches	Nov. 1885	Nov. 1874	See	Note	Below	All Ditches	All Ditches	Jan. 1879	All Ditches	All Ditches
Oct. 25	All Ditches	Nov. 1885	July 1879				All Ditches	All Ditches	Jan. 1879	All Ditches	All Ditches
Nov. 1	All Ditches	Nov. 1885					All Ditches				All Ditches

NOTE.—Upper Dist. No. 2, extends from Denver to Evans No. 2, ditch below Ft. Lupton. Lower Dist No. 2 includes Evans No. 2 ditch and extends to the mouth of the Cache la Poudre river. Below the mouth of St. Vrain Creek, 1874 water is supplied by seepage. IN DISTRICT NO. 3 at Greeley, 1881 water was used supplied by seepage. IN DISTRICT NO. 64 below Sterling, later ditches were supplied by seepage. When date of appropriation is not given, there was no water used for direct irrigation. When "All ditches" is given it means that all ditches demanding water for direct irrigation were supplied, not that all ditches were drawing water.

THE WEEKLY REPORTS OF THE WATER COMMISSIONER OF DISTRICT NO. 3 SHOW THE FOLLOWING AMOUNTS OF WATER BROUGHT OVER FROM DISTRICTS NOS. 47-48 AND 51, INTO DISTRICT NO 3, DURING 1913.

	From District No. 47 in Acre-Feet	From District No. 48 in Acre-Feet	From District No. 51 in Acre-Feet	Total
April	0	0	0	0
May	140	2,930	1,470	4,540
June	1,684	6,616	5,736	14,036
July	622	4,168	2,454	7,244
August	216	1,558	434	2,208
September	232	762	0	994
October	88	0	0	88
November	0	608	0	608
Totals	2,982	16,642	10,094	29,718
Stored in Dist. No. 3	574 in Fossil Creek Res. and Cameron Res.	860 In Chambers Lake & Rocky Ridge Res.	0	1,434
Used for direct irrigation	2,408 By North Poudre Canal & Larimer County Ditch	15,782 By Larimer County Ditch	10,094 By Larimer County Ditch	28,284

THE WEEKLY REPORTS OF THE WATER COMMISSIONERS SHOW THE FOLLOWING AMOUNTS OF RIVER WATER, IN ACRE-FEET, USED IN IRRIGATION DURING 1913.

Dist.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Total
1	3800	47900	24506	23452	16904	30842	58772	32924	239100
2	1920	28960	55018	43982	38990	33350	11240	3656	217116
3	400	53010	87598	35948	20188	10826	0	84	208054
4	0	18200	37862	22498	11372	10684	0	0	100616
5	0	13076	16524	7962	3388	3976	0	0	44926
6	No report	11260	30828	15780	5710	5440	830	30	69878
7	270	18700	35394	24022	14338	13500	5050	0	111274
8	No report	21546	18428	16896	9072	11276	8910	0	86128
9	0	3070	7728	6204	5386	4640	1116	0	28144
64	0	20118	17578	18630	15060	20590	11390	2500	105866
Total	6390	235840	331464	215374	140408	145124	97308	39194	1211102

THE WEEKLY REPORTS OF THE WATER COMMISSIONERS SHOW THE FOLLOWING AMOUNTS OF RESERVOIR WATER, IN ACRE-FEET, USED IN IRRIGATION DURING 1913. SEE "NOTE" BELOW.

Dist.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Total
1..........	0	0	10304	7574	11154	648	0	0	29,690
2..........	0	0	0	7800	3828	660	0	0	12,288
3..........	0	2100	18240	13272	21700	8850	0	0	64,162
4..........	0	0	1664	1738	1950	964	0	0	6,316
5..........	0	0	5552	3730	4270	0	0	0	13,552
6..........	No report	0	4954	5190	930	0	0	0	11,074
7..........	0	0	0	390	0	0	0	0	390
8..........	No report	0	10954	9780	5224	810	0	0	26,786
9..........	0	0	0	0	0	0	0	0	0
64..........	0	0	280	3660	1284	144	0	0	5,368
Totals......	0	2100	51948	53134	50340	12076	0	0	169,598

NOTE.—The above quantities do NOT include the water run from reservoirs directly to the land irrigated without first passing through the rivers or used in exchange for river water. They only include the reservoir water that was discharged into the rivers and re-diverted, or discharged into the rivers or into ditches in exchange for river water. The annual reports of the Water Commissioners show that by the three above methods of using reservoir water for irrigation, District No. 1 used 82,250 acre-feet; District No. 2 used 47,492 acre-feet; District No. 3 used 139,189 acre-feet, and District No. 4 used 38,061 acre-feet, during 1913.

THE WEEKLY REPORTS OF THE WATER COMMISSIONERS SHOW THE FOLLOWING AMOUNTS OF RIVER WATER AND RESERVOIR WATER, IN ACRE-FEET, USED IN IRRIGATION DURING 1913. SEE "NOTE" BELOW.

Dist.	April	May	June	July	August	Sept.	Oct.	Nov.	Total
1..........	3800	47900	34810	31026	28058	31490	58772	32924	268780
2..........	1920	28960	55018	51782	42818	34010	11240	3656	229404
3..........	400	55110	105838	49220	41888	19676	0	84	272216
4..........	0	18200	39526	24236	13322	11648	0	0	106932
5..........	0	13076	22076	11692	7658	3976	0	0	58478
6..........	No report	11260	35782	20970	6640	5440	830	30	80952
7..........	270	18700	35394	24412	14338	13500	5050	0	111664
8..........	No report	21546	29382	26676	14296	12086	8910	0	112896
9..........	0	3070	7728	6204	5386	4640	1116	0	28144
64..........	0	20118	17858	22290	16334	20734	11390	2500	111234
Total......	6390	237940	383412	268508	190738	157200	97308	39194	1380700

NOTE.—The above quantities do NOT include the water run from reservoirs directly to the land irrigated without first passing through the rivers or used in exchange for river water. They only include the reservoir water that was discharged into the rivers and re-diverted, or discharged into the rivers or into ditches in exchange for river water.

THE WEEKLY REPORTS OF THE WATER COMMISSIONERS SHOW THE FOLLOWING AMOUNTS OF WATER, IN ACRE-FEET, DIVERTED FROM THE RIVERS FOR STORAGE IN RESERVOIRS DURING 1913.

Dist.	April	May	June	July	August	Sept.	Oct.	Nov.	Total
1...........	44756	12160	0	0	0	0	0	18392	75308
2...........	15380	1800	0	0	0	0	15080	13768	46028
3...........	16014	14150	462	0	0	2714	12314	9642	55296
4...........	10320	6294	0	0	0	834	6332	4026	27806
5...........	3202	5326	0	3668	0	480	4014	1372	18062
6...........	No report	6840	0	0	0	270	2240	1290	10640
7...........	2992	3140	0	0	0	0	2400	3370	11902
8...........	Reservoi	rs full Ma	y 1st, 191	3					
9...........	2520	880	0	0	0	0	336	1530	5266
64...........	840	700	0	0	0	0	8700	16080	26320
Total.......	96024	51290	462	3668	0	4298	51416	69470	276628

NOTE.—The above table includes the 1434 acre-feet of water brought over from Districts 47 and 48 and stored in District No. 3, but does not include the water transferred from one reservoir to another via the river.

THE WEEKLY REPORTS OF THE WATER COMMISSIONERS SHOW THE FOLLOWING AVERAGE DAILY UNSUPPLIED SHORTAGE OF WATER FOR IRRIGATION, IN SECOND-FEET, DURING 1913. SEE "NOTE" BELOW.

Dist.	April	May	June	July	August	Sept.	Oct.	Nov.
1..........	0	Last 7 days	624	604	769	600	First 3 days	0
2..........	0	200	194	418	464	125	0	0
3..........	....	276	689	607	320	74	....	....
4..........	....	0	516	348	189	47	....	....
5..........	....	0	95	183	106	22	....	....
6..........	No repo	rt 0	493	346	225	76	0	....
7..........	0	0	142	270	274	84	0	....
8..........	No repo	rt 114	133	154	318	168	30	....
9..........	....	0	18	47	32	18	First 3 days	....
64..........	....	Last 7 days	358	591	687	536	0	0
Totals.....	0	590	3462	3568	3384	1750	30	0

NOTE.—When quantities are not given there was no water used for direct irrigation. When the first and last days are noted, there was a small shortage during those days, but no shortage during the balance of the month.

A CONDENSED STATEMENT OF THE WEEKLY REPORTS OF THE WATER COMMISSIONERS FOR 1913 IS AS FOLLOWS:

If we take Districts 1 to 9, both inclusive, and District No. 64 covering the South Platte River and its tributaries from Platte Canon to the Colorado-Nebraska line, a distance of 250 miles, we have the following table:

	Amount of Water Diverted from the Rivers for Storage in Reservoirs in Acre-Feet	Amount of Reservoir Water Used in Irrigation in Acre-Feet See "Note"	Amount of River and Reservoir Water Used in Irrigation in Acre-Feet See "Note"	Average Daily Unsupplied Shortage of Water for Irrigation in Second-Feet
April	96,024	0	6,390	0
May	51,290	2,100	237,940	590
June	462	51,948	383,412	3,462
July	3,668	53,134	268,508	3,568
August	0	50,340	190,748	3,384
Sept.	4,298	12,076	157,200	1,750
Oct.	51,416	0	97,308	0
Nov.	69,470	0	39,194	0
Totals	276,628	169,598	1,380,700	....

NOTE.—The "Amount of Reservoir Water Used in Irrigation" and "Amount of River and Reservoir Water Used in Irrigation" given above, do NOT include reservoir water run directly from the reservoirs to the land irrigated, without first passing through the rivers or used in exchange for river water. They only include the reservoir water that was discharged into the rivers and re-diverted, or discharged into the rivers or into ditches in exchange for river water.

IRRIGATION DIVISION NO. 1.

TABULATED STATEMENT OF WATER COMMISSIONERS' ANNUAL RESERVOIR REPORTS FOR THE IRRIGATION SEASON OF 1913.

Dist.	Number of Reservoirs Reported	Area of High Water Line Acres	Capacity in Acre-Feet	Quantity of Water in Reservoirs May 1, 1913 Acre-Feet	Quantity of Water in Reservoirs Nov. 1, 1913 Acre-Feet	Quantity of Water held Over from Nov. 1, 1912 Acre-Feet
1	5	10,295	149,867	110,494	None	27,376
2	19	8,644	153,455	113,286	22,300	78,330
3	59	9,980	156,256	125,459	45,317	83,794
4	16	6,130	95,949	69,093	40,600	49,601
5	14	2,376	41,912	28,512	19,217	33,819
6	31	2,577	41,651	21,598	4,894	22,079
7	94	Not reported	19,822	17,714	9,110	16,818
8	3	600	10,000	10,000	3,500	3,507
9	36	1,729	28,433	24,526	13,987	20,706
23 (A)	2	5,760	164,628	114,514	96,857	111,512
46		No Reservoirs Reported				
47		No Reservoirs Reported				
48		No Reservoirs Reported				
64	3	6,982	142,341	60,277	7,434	15,411
65 (B)	4	70	574	Not Reported	46	11,128
Totals	286	55,143	1,004,888	695,473	263,262	474,081

(A) Compiled from the records in office of Division Engineer. No annual report received from the new water commissioner, as he did not qualify until late in July.

(B) Two of these reservoirs not in use, dams broken.

The foregoing tables show that during June, July, August and September, 1913, there was an average unsupplied shortage of water for direct irrigation in the South Platte drainage of 3,000 second-feet.

During June, July, August and September, 1912, there were diverted from the rivers for storage in reservoirs 213,614 acre feet of water. During the corresponding months of 1913, only 8,428 acre feet were diverted for storage.

The amount of water stored in the 218 reservoirs reported in this division, on November 1st, 1912, was 474,081 acre feet.

On November 1st, 1913, there were only 263,262 acre feet in the 286 reservoirs reported, or a shortage of 210,819 acre feet, when compared with the amount in storage on November 1st, 1912.

It should be borne in mind that the above tables refer only to the reservoirs that are reported by the Water Commissioners and do not include all of the reservoirs decreed or undecreed.

There are in the South Platte drainage, not including the South Park, Dist. No. 23, 252 decreed reservoirs with a storage capacity of 342,000 acre feet.

If to these we add the three large decreed reservoirs in Dist. No. 23, to-wit: Lake Cheesman, Lost Park and Antero, with a storage capacity of 210,578 acre feet, we have a total storage capacity in 255 decreed reservoirs of 552,578 acre feet.

There are today nine undecreed reservoirs diverting water directly from the South Platte river, between Denver and Sterling. Their total shortage capacity is about 350,000 acre feet.

If we include Standley Reservoir in Dist. No. 7 with a storage capacity of 45,000 acre feet, we have a total storage capacity in these ten undecreed reservoirs of 395,000 acre feet.

Combining the above decreed and undecreed reservoirs, we have 265 reservoirs with a storage capacity of 947,578 acre feet. In addition to the above, there are an unknown number of small undecreed reservoirs in the division, some of which are included in the reservoir reports of the Water Commissioners.

During November, there has been a reported storage of 69,470 acre feet. We, therefore, on December 1st, 1913, have in storage 332,732 acre feet of water.

It is conservative to estimate the shortage of water for storage in the South Platte drainage on December 1st, 1913, as 614,000 acre feet.

To supply this shortage, it will require a diversion from the streams of not less than 800,000 acre feet of water.

Even though the snowfall during the coming winter months should be above normal, we cannot predict with any degree of certainty that this shortage will be made good, as we cannot control the run-off from the accumulated snow next spring. Predictions as to the supply of water during the coming season, based alone upon the amount of snowfall during the winter, are very liable to turn out as simply another "Iridescent dream."

The amount of run-off in the spring months from the snow stored in the mountains, that will be available for storage in reservoirs depends more upon the amount of rain that falls during those months, than upon the snow accumulation. Without seasonable rains the snow melts slowly and is absorbed by the ground, or it is evaporated by the winds and the result is a large "cut-off" and "fly-off" and a small "run-off" only sufficient to supply the ditches with their decreed appropriations for direct irrigation.

These are cold facts and do not dove-tail at all, with the popular fallacy, that there is a great lack of reservoirs in this division for the storage of the surplus water. The contrary is the truth, there is a surplus of reservoirs and a lack of water to fill them once each year.

Mr. John K. Samples, Water Commissioner of District No. 1, makes the following special report:

ACREAGE OF CROPS RAISED WITHOUT IRRIGATION, 1913.

Alfalfa	1200 Acres.	Average yield 2 tons per acre
Wheat	25000 acres.	Average yield 5 bushels per acre
Oats	12000 acres.	Average yield 10 bushels per acre
Barley	8000 acres.	Average yield 10 bushels per acre
Corn	35000 acres.	Average yield 8 bushels per acre
Potatoes	3000 acres.	Average yield 40 bushels per acre
Spelts	9000 acres.	Average yield 11 bushels per acre
Other Crops	20000 acres.	
Total	113,200 acres.	

I hereto attach the regular statutory tabulation of the Water Commissioner's annual reports.

Respectfully submitted,

(Signed) F. COGSWELL,

Irrigation Division Engineer Irrigation Division No. 1.

IRRIGATION DIVISION NUMBER 1.

TABULATED STATEMENT OF WATER COMMISSIONERS' ANNUAL DITCH REPORTS FOR THE IRRIGATION SEASON OF 1913.

(1) District	(2) Amount of Appropriation in Second-Feet	(3) Capacity of Ditches in Second-Feet	(4) Length of Main Ditches in Miles	(5) Length of Laterals in Miles	(6) First Day Water Diverted from Natural Streams for Irrigation
1.............	2,076	2,697	367	257	April 20
2.............	4,044	2,854	254	73	April 22
3.............	3,569	3,469	352	1,288	April 17
4.............	2,445	2,670	220	120	April 1
5.............	2,513	1,451	238	226	March 3
6.............	2,557	1,978	305	169	March 26
7.............	1,708	Not Reported	232	Not Reported	March 19
8.............	1,825	1,685	232	235	March 1
9.............	393	429	52	35	March 12
23.............	No Report Recei	ved. New Water	Commissioner in	July.	
46.............	1,914	1,879	183	....	April 25
47.............	The Water Comm	issioner only repor	ts relative to 14 D	itches out of a tot	al of 371 decreed
	appropriations.	He reports an a	bundance of wate	r for all the unrep	orted ditches.
48.............	573	....	84	....	April 15
64.............	3,604	3,614	269	783	April 1
65.............	164	205	28	....	Not Reported
Totals.........	27,385	22,931	2,816	3,186	March 1

IRRIGATION DIVISION NO. 1.

TABULATED STATEMENT OF WATER COMMISSIONERS' ANNUAL DITCH REPORTS FOR THE IRRIGATION SEASON OF 1913.

District	(7) Last Day Water Diverted from Natural Streams for Irrigation	(8) Maximum No. of Days Water Diverted from Natural Streams for Irrigation	(9) Maximum No. of Days Water Carried from Reservoirs	(10) Amount of Water Carried from Reservoirs in Acre-Feet
1	Nov. 18	212	110	82,250
2	Nov. 30	223	95	47,493
3	Sept. 30	167	Not Reported	139,189
4	Nov. 4	318	110	38,061
5	Sept. 30	212	Not Reported	Not Reported
6	Oct. 24	213	76	16,485
7	Nov. 15	242	Not Reported	Est. 8,600
8	Nov. 1	245	125	29,348
9	Oct. 31	234	Not Reported	Est. 10,500
23	....	....	....	....
46	Aug. 15	112	No Reservoirs Reported	
47	....	....	....	....
48	Sept. 30	169	No Reservoirs Reported	
64	Nov. 1	215	87	51,706
65	Nov. 6	145	Not Reported	
Totals	Nov. 30	275	125	423,631

IRRIGATION DIVISION NO. 1.

TABULATED STATEMENT OF WATER COMMISSIONERS' ANNUAL DITCH REPORTS FOR THE IRRIGATION SEASON OF 1913.

District	(11) Average Daily Amount of Water Diverted by Ditches During Season from Natural Streams for Irrigation Second-Feet	(12) No. of Acre-Feet Diverted by Ditches During Season from Natural Streams for Irrigation	(13) Total No. of Acres That Can be Irrigated See 'Note"	(14) Crops Irrigated, Etc.	(15)
				Alfalfa	Natural Grasses
1	1,083	232,846	152,800	25,892	14,022
2	771	237,612	94,565	22,622	3,767
3	1,180	275,992	374,800	54,695	6.915
4	478	119,726	112,055	28.975	1,150
5	388	86,640	111,684	31,302	4.928
6	556	71,734	98,857	33,710	10,535
7	363	114,199	121,700	32,150	7,205
8	340	94,261	113,053	13,580	1,638
9	135	33,325	13,090	5,770	297
23					
46	1 467	185,909	89,700		50,295
47					
48	328	44,854	10,803	20	4,981
64	698	128,499	101,882	29,311	19,880
65	53	11,100	2,870	1,080	555
Totals	7,840	1,636,697	1,397,859	279,107	126,168

NOTE.—The quantities given in columns (13) to (24) represent the total acreage that can be irrigated or was irrigated, whether the ditches only used the natural flow of streams, or used river and reservoir water combined. The total amount of water used in any district, except in Districts Nos. 3 and 7, will be found by adding together the "No. of Acre-Feet Diverted by Ditches During Season from Natural Streams," given in column (12) and the "Amount of Water Carried From Reservoirs in Acre-Feet" as given in column (10). In District No. 3, 28,284 acre-feet were diverted from Districts Nos. 47-48 and 51. Also an unknown amount of reservoir water was used. In District No. 7, 1,150 acre-feet were diverted from District No. 51 and used by the Golden City and Ralston Creek Ditch.

IRRIGATION DIVISION NO. 1.

TABULATED STATEMENT OF WATER COMMISSIONERS' ANNUAL DITCH REPORTS FOR THE IRRIGATION SEASON OF 1913.

CROPS IRRIGATED FROM CANALS IN ACRES, SEE "NOTE" BELOW

District	(16) Cereals	(17) Orchards	(18) Market Gardens	(19) Potatoes	(20) Sugar Beets	(21) Other Crops
1	27,020	234	30	2,230	15,285	5,371
2	39,775	228	4,174	1,868	14,944	1,536
3	87,969	2,343	1,581	21,190	46,115	4,382
4	55,150	1,380	180	2,375	15,025	2,825
5	46,061	1,198	872	100	18,800	875
6	35,432	2,188	1,060	270	8,940	2,120
7	45,920	3,875	9,640	....	500	75
8	19,309	3,451	2,080	100	474	6,303
9	3,801	206	65	....	423	47
23	....	....	....	....	....	....
46	283	....	....	....	....	....
47	....	....	....	....	....	....
48	....	....	....	5	....	30
64	19,685	135	47	1,789	15,843	432
65	224	7	12	27	38	....
Totals	380,629	15,245	19,741	29,954	136,387	23,996

IRRIGATION DIVISION NO. 1.

TABULATED STATEMENT OF WATER COMMISSIONERS' ANNUAL DITCH REPORTS FOR THE IRRIGATION SEASON OF 1913.

Crops Irrigated from Canals in Acres				Cost—Dollars		
District	(22)	(23)	(24) Total Irrigated	(25) Superintendence	(26) Repairs	(27) Improvements
1			90,084	$ 14,070	$ 2,350	$ 16,250
2			88,914	19,150	5,320	7,580
3			225,190	21,984	57,320	93,915
4		Peas 1,520	108,580	10,340	5,800	
5			104,136	7,435	6,260	4,035
6			94,255	3,890	18,680	15,320
7			99,365	Not Reported		
8		Celery 60	46,995	12,066	10,363	91,610
9	Timothy 197	Corn 92	10,898	2,200	2,002	1,852
23						
46	Pasture 39,122		89,700			
47						
48	Timothy 352		5,388			
64			87,122	6,125	4,380	4,690
65			1,943		1,820	
Totals	39,671	1,672	1,052,570	$ 97,260	$114,295	$235,252

Denver, Colo., Dec. 10, 1914.

Mr. John E. Field,
State Engineer,
Denver, Colo.

Dear Sir: I herewith submit a report of the work of Irrigation Division No. 1, during the fiscal year ending November 30th, 1914.

The most notable event of 1914, relative to the distribution of water, was the decision of the Supreme Court of this State handed down on December 7th, 1914, in Case No. 7582, Charles W. Comstock, state engineer, et al., vs. The Larimer & Weld Reservoir Company. In substance and effect the opinion declares that there can be no fixed irrigation or non-irrigation season in this state. The year cannot be divided into two seasons, one for direct irrigation and the other for storage of water in reservoirs. The waters of a river with its tributaries must be distributed as a whole, among those entitled to the decreed priorities for irrigation, and other beneficial uses, in accordance with the dates of such priorities and the needs of the parties for whose benefit such priorities were decreed. The courts cannot arbitrarily fix a definite season for direct irrigation, under a vested right, when no such limitation is "attached to it by the decree itself, or by any constitutional or statutory provision or decision of this Court".

The decree itself may fix a limitation as to the time of use of water or it may be fixed in a proper action where it can be shown, "by competent evidence, that the actual use had been in fact so limited".

"The question of the division of the year into direct irrigation and storage seasons is not a judicial one". Where that power lies is "left entirely open and unaffected by this decision".

Even, "a custom for the past twenty years" will not be allowed to overturn and nullify any constitutional or statutory provision of our irrigation laws, or the uniform and unbroken line of judicial decisions.

The Court said, "that is, users and consumers of water for irrigation in one district cannot make and apply regulations in the administration of their priorities according to their own interpretation of them, and to meet their needs as they think they should be met; but the waters of a division must be distributed to all consumers under the uniform rule provided by law."

The irrigation officials and users of water in the other districts, of the same division, are not bound by any custom or usage that may prevail in any particular district. The waters of a tributary are waters of the South Platte river, and a junior appropriator on the tributary can no more interfere adversely with the rights of a senior on the South Platte river proper, than he can do so at the headgate of the senior ditch.

Direct irrigators should not be allowed to divert water in excess of their needs, nor to use it in a non-economical and wasteful manner.

"Each separate offender, or those acting jointly would be held to answer for his or their own wrong in independent actions".

The unexpected has happened. The State of Colorado has gone "Wet" in one way and "Dry" in another. Although the spring months were the wettest ever known in this State, it is conceded by all that November 3, 1914 was the dryest day that Colorado has ever seen. It serves to teach us that the thing that "cannot happen" has a way of happening.

The "Big Snow" of the first week of December 1913 did not furnish much water for storage. It was nearly all absorbed by the dry ground and the direct run off was very slight. It was a phenomenon and cannot be looked for more than once in fifty years. The effects of the "Big Snow" on the run-off were not felt until April 1914. There was more water passing through Denver during April than during the preceding four months from Dec. 1st to April 1st.

There was a shortage of water for storage in district No. 1 during Dec. 1913 and the South Platte River was dry at one or more places until Jan. 3, 1914. There was no water passing from district No. 1 to No. 64 during that time.

The Cache la Poudre river was dry below the inlet of Fossil Creek reservoir until Feb. 1, 1914.

The Big Thompson River was dry below the inlet of Lake Loveland until April 1, 1914. Clear Creek was dry below the inlet of Standley Lake until April 1, 1914. During the winter months Lake Cheesman discharged about 7,000 acre feet of stored water into the general supply of the South Platte River, but was again full on April 3rd.

The rainfall in Denver during last April totaling 3.75 inches, or 1.58 inches above normal, was greater than in forty of the last forty-three Aprils. The abnormal precipitation of the spring months coming on top of the "Big Snow" delayed the field work in some of the districts and the packing of the soil by heavy rains necessitated replanting of some beet fields. It is reported that many workings of the mines in the mountains were drowned out on account of the veins and drifts being full of water from the melting snow and spring rains.

Many of the reservoir inlet ditches were filled with ice and snow during the winter and were not able to divert any water for storage until March.

The "Big Snow" of December 1913 should be charged to the supply of water for irrigation during 1914. We, therefore, so far as the resultant run-off is concerned, have from Dec. 1, 1913 to Sept. 1, 1914, a run-off from a precipitation equal to 17.83 inches at 17 stations in the South Platte drainage area above the mouth of Cache la Poudre river. (See following table of precipitation.)

Now in the language of the street, this is certainly "going some" for an arid state.

During 1914, the ditches diverting water directly from the South Platte river have been well supplied, and there has been a shortage of water since June 27th in the tributaries in districts Nos. 3, 4 and 6. There was a shortage in district No. 3 during August and in No. 7 since August 8th.

The first demand for water from district No. 1 was received July 2nd to supply a shortage of 280 second-feet of 1882 and 1888 water. The first demand for water from district No. 2 was received on July 2nd to supply a shortage of 617 second-feet for appropriations prior to January 1, 1886. 302 second-feet of this shortage was prior to January 1, 1879. This shortage in district No. 2 was of short duration and on July 18th, the water commissioner reported his district supplied.

The first shortage of water for direct irrigation and the first use of reservoir water, were reported on June 27th in districts Nos. 3, 4 and 6.

After the rivers went down during the last week in June, many ditches were unable to divert water on account of washed out dams and headgates. In district No. 7 on July 10th, there was a landslide on South Table Mt. one-half mile below the headgate of the Agricultural ditch. The ditch was unable to divert water for 35 days.

In July the Water Commissioner of district No. 6, reported that the second crop of alfalfa fell short on account of using too much water.

The South Platte river was reported dry at Merino from July 2nd to July 20th.

On July 25th I received demand from Mr. D. T. Bush, Supt. of the Julesburg Irrigation District for 700 sec-ft. to supply his decreed appropriations. He had been receiving only 50 second-feet of these priorities during July. After July 30th his demands were supplied, although on Aug. 31st he was receiving only 130 second-feet, but he was satisfied with that amount.

During July and August the river was dry at Sedgwick below the headgate of the Peterson Ditch, except from Aug. 5th to morning of Aug. 10th. On August 5th I measured the South Platte river at Julesburg and found only 78 second-feet. On August 6th I found 285 second-feet passing Sedgwick.

The Riverside Irrigation District and the Bijou Irrigation District were not supplied with any water on their decreed appropriations after July 1st until Aug. 3rd.

The Water Commissioner of district No. 2, on Aug. 3rd reported that an undecreed ditch near Denver, had diverted 176 second-feet of river water without his permission. On my return from Julesburg Aug. 8th I instructed No. 2 to shut out all river water from the undecreed ditch and to place locks on the headgates. On Aug. 17th he reported that he had complied with the order.

On Oct. 14th orders were sent to all districts in the South Platte drainage, to store water in any decreed reservoir. On Oct. 24th permission was given to all the districts to store in undecreed reservoirs, provided the demands of their decreed reservoirs were supplied.

On Dec. 1st orders were issued to stop all storage in undecreed reservoirs until further instructions from this office, on account of a shortage of 500 second-feet for storage in decreed reservoirs in district No. 1.

The South Platte river has been reported dry at one or more places in district No. 1 since Nov. 14th; the Cache la Poudre river since June 27th; the Big Thompson river since Oct. 25th; the St. Vrain river and Clear Creek since Oct. 31st.

Any statement at this time that there will be an abundant supply of water for irrigation during 1915 is premature. There is no assurance that there will be any heavy snow falls during the coming winter, or seasonable rain in the spring months. These are prime factors in our water supply.

Since the "Carpenter" bill went into effect in 1911, this office has sent repeated instructions to the water commissioners to notify the ditch and reservoir owners to comply with the requirements of Section 2 of the bill, relative to the installation of self registering devices when water is transferred from one stream to another, or from a reservoir to a ditch via the river. So far as this office is advised, very few of the self registers have been installed. I have also sent instructions relative to the location and construction of rating flumes in ditches and canals, a copy of which is as follows:

Circular letter to Water Commissioners in Division No. 1, relative to the location and construction of rating flumes.

(1) The rating flume should be an open flume, with apron and wings, located not less than 200 feet, nor more than 1,000 feet below the headgate.

(2) If part of the water in the ditch is to be discharged through a waste gate and the balance passed down the ditch, the flume should be located not less than 200 feet below the waste gate, but in either location it should be above all lateral gates where practicable.

(3) It should be located in a straight part of the ditch and the channel should have a uniform grade and cross section for 100 feet up stream from the flume, and should be straight for that distance, with its axis passing through the middle of the flume and parallel to it.

(4) The upstream end of the flume should be placed at the practical grade of the ditch. The bottom should be horizontal in both directions and the sides vertical.

(5) The length of the flume should not be less than twelve feet for ditches whose bottom width six feet or less, nor less than sixteen feet for ditches between six and twelve feet in width, and

twenty-four feet for widths between twelve and twenty-four feet. For larger ditches, the length should not be less than the width of the ditch.

(6) The width of the flume should be equal to the bottom width of the ditch plus the depth of water that the ditch is intended to carry. One-half of this depth being added to the bottom width of the ditch on each side of the flume. If the flume is too narrow, there will be a material contraction at the upstream end and if it is too wide, the velocity will be reduced and eddies formed.

(7) The sides of the flume should be high enough to contain all the water when the ditch is carrying its maximum capacity.

(8) The floor and sides should be smoothly laid and the material used should be heavy enough to prevent warping or twisting out of shape. For flumes 16 feet long, the sills and posts should be 6″ x 6″ lumber and 2″ planks used for the bottom and outside of the sides. The sides being lined with 1″ boards.

(9) The upstream end should have a submerged apron to prevent leakage, this to extend 2 feet below the bottom. There should also be wings extending into the bank beyond the surface of the water, at an angle not to exceed 30 degrees with the axis of the ditch. The foundation timbers should be solidly imbedded, and the earth around them and around the sides of the flume carefully and solidly rammed in order to prevent settlement or passage of water around either the bottom or sides.

(10) There should be a cross beam or bridge just below the center of the flume for convenience in making measurements.

DECREED AND UNDECREED APPROPRIATIONS OF THE RESERVOIRS DIVERTING WATER FROM SOUTH PLATTE RIVER AND LOST PARK CREEK AND ALSO STANDLEY LAKE FROM CLEAR CREEK. COMPILED NOVEMBER 30, 1914.

Name of Reservoir		Date of Appropriation	Gage Rod Feet	Amount of Appropriation Acre-Feet	Area at Highwater Line—Acres
Antero	Decreed	Oct. 8, 1907	36.00	85,564	4,886
Lidderdale or Lake George	Decreed	Aug. 31, 1890	15.00	735	84
Lost Park	Decreed	Oct. 3, 1907	250.00	45,914	180
Cheesman	Decreed	June 27, 1889	140.67	30,691	497
			Total	Enlgt. 48,373	
Cheesman Enlgt.	Decreed	Sept. 24, 1893	212.00	Total 79,064	Total 874
		Jan. 10, 1907			
Standley	Not Decreed	Mar. 4, 1902	95.00	45,000	1,800
Barr (Oasis)	Decreed	Nov. 20, 1885	19.10	11,081	803
		June 11, 1906	Total	Enlgt. 25,240	
Barr Enlgt.	Not Decreed	Dec. 11, 1902	45.00	Total 36,321	Total 1,883
Horse Cr.	Not Decreed	Jan. 14, 1908	60.00	29,356	1,200
		May 29, 1909			
Milton	Not Decreed	Jan. 9, 1907	35.00	43,262	2,342
Lr. Latham	Not Decreed	Sept. 20, 1898	13.00	4,325	702
(Enlgt.)			Total	Enlgt. 1,889	
Lr. Latham	Not Decreed	Sept. 20, 1900	15.00	6,214	Total 987
Empire	Decreed	May 18, 1905	30.00	37,709	2,842
Riverside	Decreed	April 1, 1902	17.41	16,070	1,900
			Total	Enlgt. 41,437	
Riverside Enlgt.	Decreed	Aug. 1, 1907	32.00	Total 57,507	Total 3,700
Jackson Lk.	Decreed	May 18, 1901	28.70	31,708	2,447
			Total	Enlgt. 3,227	
Jackson Lk. Enlgt.	Provisional	May 18, 1901	30.00	Total 34,935	Total 2,534
Bijou No. 2	Decreed	Jan. 15, 1909	20.00	9,183	800
Pt. of Rocks	Not Decreed	Nov. 9, 1905	59.00	81,329	3,082
Prewitt	Not Decreed	Jan. 15, 1906	25.00	23,916	2,117
Julesburg	Decreed	Feb. 12, 1904	28.00	28,178	1,578
Total				644,187	30,889

Horse Creek Reservoir broke night of Jan. 28, 1914.

DECREED RESERVOIRS IN SOUTH PLATTE RIVER DRAINAGE, NOVEMBER 30TH, 1914.

District	Number of Decreed Reservoirs	Number of Decreed Appropriations	Date of Earliest Appropriations	Date of Latest Appropriations	Total Amount of Decreed Appropriation Acre-Feet
1.............	112	124	Dec. 1, 1888	May 1, 1912	480,594
	"Provisional" de	crees for 332,826	Acre-ft. and "Fin	al" decrees for 14	7, 768 acre-feet.
2.............	24	30	Sept. 1, 1869	April 25, 1906	23,487
3.............	44	60	April 15, 1875	July 10, 1904	133,387
4.............	37	41	Feb. 1, 1881	May 2, 1906	104,494
5.............	58	69	June 1, 1871	Dec. 10, 1904	25,184
6.............	56	73	Sept. 1, 1869	Dec. 13, 1906	29,101
7.............	28	35	1866	Dec. 1906	12,284
8.............	23	21	Apr. 30, 1871	Aug. 30, 1893	5,906
9.............	20	23	May 1, 1873	Dec. 6, 1882	Est. 5,100
23.............	17	18	Dec. 31, 1877	July 13, 1910	288,542
	"Provisional" de	crees for 71,648 A	cre-ft. and "Final	" decrees for 216,	894 acre-feet.
64.............	4	6	Nov. 15, 1888	Dec. 16, 1906	28,568
Totals.......	423	500	1866	May 1, 1912	1,136,647

NOTE.—There are two duplicates in above table. Kinnear Reservoir decreed in Districts No. 2 and No. 6 for 940 acre-ft. Culver Reservoir decreed in Districts No. 4 and No. 5 for 150 acre-ft.

The following tables of precipitation at 22 stations in the drainage area of the South Platte River are compiled from the reports of the U. S. Weather Bureau. The 1st table of 17 stations located above the mouth of the Cache la Poudre River. The 2nd table of 5 stations located below the mouth of the Cache la Poudre River.

Name of Station	Dec. 1913 Inches	Jan. 1914 Inches	Feb. 1914 Inches	Mar. 1914 Inches	April 1914 Inches	May 1914 Inches	June 1914 Inches	July 1914 Inches	Aug. 1914 Inches
Boulder	4.20	0	0.08	1.77	3.38	3.57	1.70	....	1.97
Castle Rock	5.35	0.06	0.36	0.50	2.91	2.65	1.14	3.33	1.99
Cassels	2.57	0.40	0.33	0.66	2.55	1.47	1.59	5.54	2.49
Cheesman	4.82	0	0.08	1.03	2.82	2.45	1.79	6.78	1.55
Denver	5.21	0.03	0.39	2.02	3.75	3.55	1.67	1.49	2.43
Estes Park Fish Hatc'y	2.95	0.59	0.12	0.98	1.98	2.37	1.32	4.36	1.75
Fort Collins	4.08	0.35	0.30	0.87	3.23	2.73	2.01	1.68	1.27
Fort Lupton	3.85	0.08	0.05	0.72	1.89	2.49	0.73	1.44	2.91
Fry's Ranch	5.90	1.00	0.66	0.41	2.45	2.03	0.82	1.77	1.45
Georgetown	4.17	0.49	0.04	1.54	2.07	1.50	1.21	4.57	2.14
Greeley	4.79	0.01	0.11	0.61	1.34	2.92	1.98	....	....
Hartsel	0.91	0.17	0	0.37	0.91	0.95	2.36	8.74	2.25
Idaho Springs	4.92	0.18	0.13	1.36	1.81	0.96	0.87	4.20	2.63
La Porte	3.26	0.03	0.14	0.58	3.10	2.24	2.22	1.60	1.08
Longmont	4.23	0.07	0.10	1.18	2.78	3.46	2.05	2.64	0.58
Long's Peak	5.89	2.15	1.20	1.45	3.85	0.90	2.20	6.18	1.58
Platte Canon	....	0	0.70	1.55	1.69	2.08	1.72	2.28	1.10
Mean of stations reported	4.23	0.33	0.28	1.04	2.50	2.25	1.61	3.77	1.82

Total mean precipitation Dec. 1, 1913, to Sept. 1, 1914, 17.83 inches.

NORTHEASTERN COLORADO, DISTRICTS NOS. 1 AND 64.

Name of Station	Dec. 1913 Inches	Jan. 1914 Inches	Feb. 1914 Inches	Mar. 1914 Inches	April 1914 Inches	May 1914 Inches	June 1914 Inches	July 1914 Inches	Aug. 1914 Inches
Kersey..............	4.46	0	0.10	0	2.22	2.30	5.00	2.30	0.60
Ft. Morgan...........	....	0	0.62	0	3.74	1.39	2.43	3.69	1.33
Merino...............	....	0	0.50	....	4.32	0.20	0.60	0.15	1.70
Sterling...............	2.33	0.03	0.56	0	2.05	1.25	1.45	0.53	....
Sedgwick..............	1.75	0	0.12	0	3.50	2.60	6.22	0.50	3.11
Mean of stations reported	3.84	0.03	0.38	0	3.16	1.55	3.14	1.43	1.68

Total mean precipitation Dec. 1, 1913, to Sept. 1, 1914, 14.21 inches.

NOTE.—Your attention is directed to the exceptional precipitation above the mouth of the Cache la Poudre river, when compared with the precipitation below the mouth. The mean precipitation for the same period, at the six stations of Hartsel, Cheesman, Cassels, Platte Canon, Denver and Ft. Lupton, all located on the South Platte river above the mouth of Cache la Poudre river, was 17.48 inches, as compared with 14.21 inches at the five stations located below the mouth. An excess of 23 per cent. more precipitation on the upper reaches of the South Platte river than in the lower valley.

THE WEEKLY REPORTS OF THE WATER COMMISSIONERS SHOW THE FOLLOWING DATES OF LATEST PRIORITIES OF DECREED DITCHES DRAWING WATER FOR DIRECT IRRIGATION IN DISTRICTS 1 TO 9 AND 64, DURING 1914.

Date, Saturday	No. 1	Upper No. 2	Lower No. 2	Upper No. 3	Upper No. 4	No. 5	No. 6	No. 7	No. 8	No. 9	Upper No. 64
April 4	All Ditches								All Ditches		All Ditches
April 11	All Ditches								All Ditches		All Ditches
April 18		See Note below									All Ditches
April 25	All Ditches								All Ditches		All Ditches
May 2		Ditches							All Ditches		
May 9	All Ditches	All Ditches		All Ditches				All Ditches	All Ditches		All Ditches
May 16	All Ditches	All Ditches	All Ditches	All Ditches		All Ditches		All Ditches	All Ditches		All Ditches
May 23	All Ditches	All Ditches	All Ditches	All Ditches	All Ditches	All Ditches		All Ditches	All Ditches		All Ditches
May 30	All Ditches	All Ditches	All Ditches	All Ditches	All Ditches	All Ditches	All Ditches	All Ditches	All Ditches	All Ditches	All Ditches
June 6	All Ditches	All Ditches	All Ditches	All Ditches	All Ditches	All Ditches	All Ditches	All Ditches	All Ditches	All Ditches	All Ditches
June 13	All Ditches	All Ditches	All Ditches	All Ditches	All Ditches	All Ditches	All Ditches	All Ditches	All Ditches	All Ditches	All Ditches
June 20	All Ditches	All Ditches	All Ditches	All Ditches	All Ditches	All Ditches	All Ditches	All Ditches	All Ditches	All Ditches	All Ditches
June 27	All Ditches	All Ditches	All Ditches	Sept. 1877	Nov. 1877	All Ditches	Nov. 1873	All Ditches	All Ditches	All Ditches	All Ditches
July 4	April 1886	July 1876	July 1879	July 1873	Nov. 1877	All Ditches	Nov. 1873	All Ditches	Jan. 1879	May 1871	All Ditches
July 11	April 1888	July 1876	Dec. 1877	April 1873	Nov. 1877	All Ditches	Nov. 1873	All Ditches	Jan. 1879	All Ditches	June 1882
July 18	June 1882	All Ditches	All Ditches	Nov. 1872	Nov. 1877	All Ditches	Nov. 1873	Nov. 1881	All Ditches	All Ditches	June 1882
July 25	All Ditches	All Ditches	All Ditches	Sept. 1871	Nov. 1877	All Ditches	Nov. 1873	All Ditches	All Ditches	All Ditches	June 1884
Aug. 1	All Ditches	All Ditches	All Ditches	Nov. 1872	Feb. 1878	Sept. 1884	June 1873	All Ditches	All Ditches	All Ditches	Sept. 1894
Aug. 8	All Ditches	All Ditches	All Ditches	Sept. 1871	Oct. 1871	Sept. 1884	Nov. 1873	All Ditches	All Ditches	All Ditches	All Ditches

Aug. 15	All Ditches	All Ditches	All Ditches	April 1867	Feb. 1865	Mch. 1872	June 1865	April 1772	All Ditches	All Ditches	All Ditches
Aug. 22	All Ditches	All Ditches	All Ditches	April 1867	June 1867	Mch. 1872	Oct. 1862	April 1872	All Ditches	All Ditches	All Ditches
Aug. 29	All Ditches	All Ditches	All Ditches	Oct. 1867	Feb. 1865	Mch. 1872	Oct. 1862	Feb. 1871	All Ditches	All Ditches	All Ditches
Sept. 5	Oct. 1888	All Ditches	All Ditches	April 1867	April 1863	Mch. 1872	June 1862	Mch. 1865	All Ditches	All Ditches	All Ditches
Sept. 12	Oct 1888	All Ditches	All Ditches	April 1867	April 1863	All Ditches	June 1862	Mch. 1865	All Ditches	All Ditches	All Ditches
Sept 19	Oct. 1888	All Ditches	All Ditches	April 1867	Feb. 1865	All Ditches	May 1862	Mch. 1865	All Ditches	Mch. 1869	All Ditches
Sept. 26	All Ditches	All Ditches	All Ditches	All Ditches	Feb. 1865	All Ditches	May 1862	Oct. 1864	All Ditches	Mch. 1869	All Ditches
Oct. 3	All Ditches	All Ditches	All Ditches	All Ditches	Feb. 1865	All Ditches	May 1862	May 1864	All Ditches	Mch. 1869	All Ditches
Oct, 10	All Ditches	All Ditches	All Ditches		All Ditches		April 1865	Oct. 1864	All Ditches	Mch. 1869	All Ditches
Oct. 17	All Ditches	All Ditches	All Ditches		All Ditches	All Ditches	June 1865	Mch. 1865	All Ditches	All Ditches	All Ditches
Oct. 24	All Ditches							All Ditches	All Ditches	All Ditches	All Ditches
Oct. 31	All Ditches								All Ditches		All Ditches

NOTE.—When date of appropriation is not given there was no water used for direct irrigation. When "All Ditches" is given, it means that all decreed ditches demanding water for direct irrigation were supplied, not that all ditches were drawing water.

Upper District No. 2 extends from Denver to Evans No. 2 ditch below Fort Lupton.

Lower District No. 2 includes Evans No. 2 Ditch and extends to the mouth of the Cache la Poudre River. Below the mouth of the St. Vrain Creek, 1874 water is supplied by seepage.

In District No. 3, at Greeley, 1861 water was used, supplied by seepage.

In District No. 4, near Milliken, 1887 water was used, supplied by seepage when not required to supply the earlier appropriation in District No. 2.

In District No. 64, below Sterling, 1895 water was used, supplied by seepage.

THE WEEKLY REPORTS OF THE WATER COMMISSIONER OF DISTRICT NO. 3 SHOW THE FOLLOWING AMOUNTS OF WATER BROUGHT OVER FROM DISTRICTS NOS. 47, 48 AND 51, INTO DISTRICT NO. 3, DURING 1914.

	From District No. 47 in Acre-Feet	From District No. 48 in Acre-Feet	From District No. 51 in Acre-Feet	Total
April	0	0	0	0
May	0	0	0	0
June	690	930	2,000	3,620
July	1,540	5,912	4,574	12,026
August	394	3,098	1,042	4,534
Sept.	162	1,064	0	1,226
Oct.	0	0	0	0
Nov.	0	0	0	0
Totals	2,786	11,004	7,616	21,406
Stored in Dist. No. 3	56 In Halligan Reservoir	382 In Rocky Ridge Reservoir	0	438
Used for direct irrigation	2,730 By North Poudre Canal and Larimer County Ditch	9,962 By Larimer and Weld and Larimer County Ditches	7,616 By Larimer County Ditch	20,308

NOTE.—During June, 660 acre-feet of the water brought over from District No. 48 went to the general supply of the Cache la Poudre River.

In making this transfer of water 5 per cent. is deducted for loss in transit.

THE WEEKLY REPORTS OF THE WATER COMMISSIONERS SHOW THE FOLLOWING AMOUNTS OF RIVER WATER, IN ACRE-FEET, USED IN IRRIGATION DURING 1914.

District	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Total
1	5,300	48,236	70,886	48,988	67,630	40,084	37,560	19,980	338,664
2	1,000	29,926	66,720	70,478	59,980	46,530	19,560	280	294,474
3	0	61,180	117,460	62,556	27,994	12,626	890	490	283,196
4	0	22,082	46,396	34,620	18,720	8,088	2,410	0	132,316
5	0	15,090	34,652	25,238	9,106	4,316	1,002	0	89,404
6	0	1,200	46,986	39,046	13,438	5,260	2,598	140	108,668
7	0	8,940	33,810	35,840	20,518	9,720	6,366	280	115,474
8	2,358	13,328	29,168	38,320	27,670	22,912	16,720	448	150,924
9	0	408	5,574	9,466	7,068	4,660	2,442	0	29,618
64	19,860	23,884	23,972	25,250	40,290	17,700	12,900	0	163,856
Totals	28,518	224,274	475,624	389,802	292,414	171,896	102,448	21,618	1,706,594

THE WEEKLY REPORTS OF THE WATER COMMISSIONERS SHOW THE FOLLOWING AMOUNTS OF RESERVOIR WATER, IN ACRE-FEET, USED IN IRRIGATION DURING 1914. SEE "NOTE" BELOW.

District	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Total
1	0	0	0	1,316	84	1,498	0	0	2,898
2	0	0	0	1,500	5,182	150	0	0	6,832
3	0	0	4,880	19,650	21,900	8,800	0	0	55,230
4	0	0	260	1,938	3,172	2,240	90	0	7,700
5	0	0	0	700	5,488	2,568	36	0	8,792
6	0	0	0	3,770	4,060	1,430	456	0	9,716
7	0	0	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0	0	0
9	0	0	0	0	0	0	0	0	0
64	0	0	0	2,940	0	0	0	0	2,940
Totals	0	0	5,140	31,814	39,886	16,686	582	0	94,108

NOTE.—The above quantities do NOT include the waters run from reservoirs directly to the land irrigated without first passing through the rivers or used in exchange for river water. They only include the reservoir water that was discharged into the rivers and rediverted, or discharged into the rivers or into ditches in exchange for river water.

The annual reports of the water commissioners show that by the three above methods of using reservoir water for irrigation, District No. 1 used 110,723 acre-feet; District No. 2 used 149,508 acre-feet; District No. 3 used 99,325 acre-feet; and District No. 4 used 39,862 acre-feet during 1914.

THE WEEKLY REPORTS OF THE WATER COMMISSIONERS SHOW THE FOLLOWING AMOUNTS OF RIVER WATER AND RESERVOIR WATER, IN ACRE-FEET, USED IN IRRIGATION DURING 1914. SEE "NOTE" BELOW.

District	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Total
1	5,300	48,236	70,886	50,304	67,714	41,582	37,560	19,980	341,562
2	1,000	29,926	66,720	71,978	65,162	46,680	19,560	280	301,306
3	0	61,180	122,340	82,206	49,894	21,426	890	490	338,426
4	0	22,082	46,656	36,558	21,892	10,328	2,500	0	140,016
5	0	15,090	34,652	25,938	14,594	6,884	1,038	0	98,196
6	0	1,200	46,986	42,816	17,498	6,690	3,054	140	118,384
7	0	8,490	33,810	35,840	20,518	9,720	6,366	280	115,474
8	2,358	13,328	29,168	38,320	27,670	22,912	16,720	448	150,924
9	0	408	5,574	9,466	7,068	4,660	2,442	0	29,618
64	19,860	23,884	23,972	28,190	40,290	17,700	12,900	0	166,796
Totals	28,518	224,274	480,764	421,616	332,300	188,582	103,030	21,618	1,800,702

NOTE.—The above quantities do NOT include the water run from reservoirs directly to the land irrigated without first passing through the rivers or used in exchange for river water. They only include the reservoir water that was discharged into the rivers and rediverted, or discharged into the rivers or into ditches in exchange for river water.

The irrigation officials have no authority to supervise the use of water by the first mentioned method.

THE WEEKLY REPORTS OF THE WATER COMMISSIONERS SHOW THE FOLLOWING AMOUNTS OF WATER, IN ACRE-FEET, DIVERTED FROM THE RIVERS FOR STORAGE IN RESERVOIRS DURING 1914.

District	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Total
1	58,848	31,770	23,936	0	10,192	0	26,320	55,042	206,108
2	9,490	1,600	0	0	0	0	5,250	11,420	27,760
3	26,270	9,990	4,290	0	0	2,780	9,820	5,470	58,620
4	5,322	608	0	0	0	0	1,442	2,440	9,812
5	560	6,960	600	0	0	0	1,204	2,166	11,490
6	3,520	7,490	0	0	0	0	98	2,172	13,280
7	2,550	620	0	0	0	0	1,960	5,180	10,310
8	140	0	0	0	0	0	0	0	140
9	5,376	3,847	1,320	88	0	0	742	448	11,821
64	1,000	0	0	0	0	0	0	0	1,000
Totals	113,076	62,885	30,146	88	10,192	2,780	46,836	84,338	350,341

NOTE.—The above table includes the 438 acre-feet of water brought over from Districts No. 47 and No. 48 and stored in District No. 3. Reservoir water discharged into the river and stored in another reservoir is NOT included. River water stored in exchange for water from another reservoir is NOT included. These exchanges exist only in districts No. 3 and No. 4.

POINT OF ROCKS RESERVOIR AND PREWITT RES. are located in District No. 64, but the headgates of the inlet ditches are in District No. 1 and the Water Commissioner of No. 1 reports the amounts diverted for storage in them. In this table these amounts are charged to District No. 1. District No. 64 is only charged with the amounts diverted for storage in Julesburg Reservoir.

STANDLEY LAKE is located in District No. 2 but the headgate of the inlet ditch is in District No. 7 and the Water Commissioner of No. 7 reports the amounts diverted for storage in it. In this table these amounts are charged to District No. 7.

District No. 2: Standley Lake Res. commenced to store water Feb. 1911, and Milton and Horse Creek Reservoirs in May, 1912. Horse Creek Reservoir broke night of Jan. 28, 1914. Loss of 12,000 acre-feet.

District No. 3: Halligan Res. commenced to store water Aug. 1910.

District No. 5: Foot Hills Res. commenced to store water May, 1912.

District No. 6: Barker Meadow Res. commenced to store water in Spring of 1912.

District No. 8: Castlewood Res. Capacity 5,257 acre-feet.

District No. 64: Point of Rocks Res. commenced to store water Feb., 1911, and Prewitt Res. commenced to store Dec., 1912. Julesburg Res. Capacity 28,178 acre-feet.

THE WEEKLY REPORTS OF THE WATER COMMISSIONERS SHOW THE FOLLOWING AVERAGE DAILY UNSUPPLIED SHORTAGE OF WATER FOR IRRIGATION, IN SECOND-FEET, DURING 1914.

District	April	May	June	July	Aug.	Sept.	Oct.	Nov.
1	0	0	0	First 18 days 303	Last 2 days 123	First 19 days 226	0	0
2		0	0	First 11 days 135	0	0	0	
3		0	Last 10 days 340	461	350	First 19 days 284	0	0
4		0	Last 10 days 334	281	218	98	First 3 days 35	
5		0	0	Last 6 days 55	47	First 5 days 60	0	
6		0	Last 10 days 400	252	154	229	First 17 days 190	0
7		0	0	7 days 100	128	191	First 17 days 116	0
8	0	0	0	First 11 days 126	0	0	0	0
9		0	0	First 4 days 55	0	12	First 17 days 13	
Upper 64	0	0	0	525	0	0	0	
Totals	0	0	1,074?	2,293?	1,020?	1,100?	354?	0

? This shortage is only for a part of the month.

NOTE.—When quantities are not given there was no water used for direct irrigation. When the first and last days are noted, there was a shortage during those days, but no shortage during the balance of the month.

A CONDENSED STATEMENT OF THE WEEKLY REPORTS OF THE WATER COMMISSIONERS FOR 1914 IS AS FOLLOWS:

If we take Districts 1 to 9, both inclusive, and District No. 64, covering the South Platte River and its tributaries from Platte Canon to the Colorado-Nebraska line, a distance of 250 miles, we have the following table:

	Amount of Water Diverted from the Rivers for Storage in Reservoirs in Acre-Feet	Amount of Reservoir Water Used in Irrigation in Acre-Feet See "Note"	Amount of River and Reservoir Water Used in Irrigation in Acre-Feet See "Note"	Average Daily Unsupplied Shortage of Water for Irrigation in Second-Feet
April	113,076	0	28,518	0
May	62,885	0	224,274	0
June	30,146	5,140	480,764	(a) 1,074
July	88	31,814	421,616	2,293?
August	10,192	39,886	332,300	1,020?
Sept.	2,780	16,686	188,582	1,100?
Oct.	46,836	582	103,030	354?
Nov.	84,338	0	21,618	0
Totals	350,341	94,108	1,800,702	....

(a) Last 10 days in June, in districts No. 3, No. 4, and No. 6.

? This shortage is only for a part of the month.

NOTE.—The "Amount of Reservoir Water Used in Irrigation" and "Amount of River and Reservoir Water Used in Irrigation" given above, do NOT include reservoir water run directly from the reservoirs to the land irrigated without first passing through the rivers or used in exchange for river water. They only include the reservoir water that was discharged into the rivers and rediverted, or discharged into the rivers or into ditches in exchange for river water.

IRRIGATION DIVISION NO. 1.

TABULATED STATEMENT OF WATER COMMISSIONERS' ANNUAL RESERVOIR REPORTS FOR THE IRRIGATION SEASON OF 1914.

District	Number of Reservoirs Reported	Area of High Water Line Acres	Capacity in Acre-Feet	Quantity of Water in Reservoirs May 1, 1914 Acre-Feet	Quantity of Water in Reservoirs Nov. 1, 1914 Acre-Feet	Quantity of Water Held Over from Nov. 1, 1913 Acre-Feet
1	5	10,295	149,867	111,249	38,294	None
2 (A)	32	9,714	160,470	143,470	812	22,300
3	57	10,224	158,073	122,261	49,816	45,317
4	15	4,905	94,843	70,510	32,698	40,600
5	14	2,795	41,912	31,660	16,297	19,217
6	27	2,638	41,955	33,545	16,922	4,894
7	53	Not reported	17,911	17,744	1,741	9,110
8	3	600	10,000	10,000	3,500	3,500
9	36	1,729	28,658	27,026	21,800	13,987
23 (B)	2	5,760	164,628	107,385	105,618	96,857
46			No reservoirs	reported		
47			No reservoirs	reported		
48	5	93	597	459	69	....
64 (A)	3	6,982	142,341	71,657	33,789	7,434
65	3	64	528	287	413	46
Totals	255	55,799	1,011,783	747,253	321,769	263,262

(A) District No. 2 includes storage in Standley Lake.

District No. 64 includes storage in Pt. of Rocks and Prewitt Reservoirs.

(B) These two reservoirs, Antero and Lake Cheesman, are compiled from the records of this office. No annual report received from the Water Commissioner of District No. 23.

During 1913 certified copies of the decrees entered in the general adjudication of water rights for ditches and reservoirs in district No. 23, were filed in this office. One decree was for use of water for irrigation and the other for non-irrigation.

During 1914 decrees were entered in general adjudications of water rights in districts No. 7 and No. 1, certified copies of which have been filed in this office.

In district No. 7 the decree is for ditches and reservoirs using water for non-irrigation, or beneficial use or application other than direct irrigation, such as domestic, power, municipal, manufacturing and other beneficial purposes.

In district No. 1 the decree is for ditches and reservoirs using water for irrigation and other beneficial purposes. This decree for district No. 1 and the findings of Referee William R. Kelly as approved by Judge Robert G. Strong, are without exception, the clearest and most explicit of any decree and findings on file in this office.

This decree has simplified the distribution of water in the South Platte drainage, not only as regards the rights of reservoirs for storage of water, but also as to the distribution of the water claimed to have been developed by so-called seepage ditches. The refusal of this office, during the past six years, to distribute this seepage water without an order from the Court, has been the basis of many injunctions issued for my better education in irrigation matters.

These findings of the referee in district No. 1, relative to claims for the *exclusive* right to water appropriated by seepage or drainage ditches; the question of "due diligence" or "reasonable time" in perfecting an appropriation; the much abused, in the past, doctrine of "appropriation by relation"; and the authorities quoted in support of his rulings, are recommended to all who are interested in the betterment of our system of appropriation of water.

They should be used as an established precedent to be followed in all future adjudications of water rights.

The statutes of this State require the clerks of The District Courts to file in this office, within ten days after they are rendered, certified copies of all decrees fixing the priorities of appropriation of water for all beneficial purposes. This law in many instances has never been complied with. I have been advised that decrees for certain ditches and reservoirs have been entered by the courts, copies of which have not been filed in this office. I have requested the owners of these appropriations and the clerks of the courts to furnish this office with copies of same, but have not been successful in obtaining them. One clerk wrote me that he would furnish this office with a copy of the decree requested, if I would send him one dollar and fifty cents. It is needless to say, that I still have my one dollar and fifty cents and the clerk still has his decree. I would recommend that the legislature be requested to pass a law, that no decree fixing priorities of appropriation of water for irrigation or any other beneficial purpose, nor any order of the Court modifying said decree, shall go into effect until a certified copy of same has been filed in the office of the State Engineer and in the office of the Division Engineer as required in Chapter 155, Sec. 11, Session Laws of 1911.

The necessity for this enactment is obvious when we recall, that the present law requires the division engineer to distribute the waters of the division, in accordance with the dates of appropriation as shown by his "Register Priorities" compiled from the decrees on file in his office.

For many years past the irrigation officials in charge of the distribution of the waters of the state have, without exception, been of the opinion that there should be a change in the methods of selecting and paying the water commissioners.

The fact that a man is a good political worker, is no criterion by which to judge of his efficiency as a water commissioner. A hammer and a saw are both useful instruments in their place, but a hammer is worthless when used to saw wood, and a saw is worse than worthless when used to drive nails.

There should be no politics in the question. It is a matter of business. We should have one of the most progressive systems for the distribution of water in the country. The changes of the personnel of the water commissioners should be for the purpose of providing adequate, efficient and constantly improving service. At present it is crude and inefficient.

Our system of distributing water has not progressed as rapidly as it should, in response to the growing demands made upon it with the increasing number of new ditches and reservoirs. There should be a rearrangement of present methods which will eliminate all useless appeals. Above all things our system should be practical and allow the division engineer to work in harmony with the water commissioners. Nothing can be accomplished if all these men are pulling in different directions. I would therefore urge that the following changes be made, which seem absolutely necessary for effective work.

All ditches should be rated at least once each year and in some cases oftener. Some of the large ditches need frequent check measurements. This would necessitate the continuous services of a hydrographer during the irrigation season.

Ditches should be required by statute to be provided with self registering devices. Water Commissioners and their deputies should give all of their time during the irrigation season, to the distribution of water. They should visit daily each ditch on the main stream of their district. Some of them never inspect the ditches near the lower end of their districts.

If these officials knew their tenure in office depended upon their efficiency and not upon their "pull", there would be a marked change for the better in some of the districts in this division.

The finest system in the world is utterly worthless without the best personnel, and the utmost possible efficiency should be demanded of them.

Under the present method of appointing and paying them, the administration of the laws lacks strength, uniformity or impartiality in their enforcement. I would, therefore, recommend that the legislature be requested to place them under the State Civil Service after an examination as to their qualifications for the position, and that they should be paid by the State a definite salary. The division engineer should be given the authority to suspend any water commissioner, without pay, for failure to carry out his instructions.

This office is in need of a filing case, book case and a map hanger, for a proper transaction of the business and preservation of the records of the division. The estimated cost of which is placed at ($100.00) One Hundred Dollars, to be covered by a special appropriation.

I hereto attach the regular statutory tabulation of the Water Commissioners' Annual Reports.

Respectfully submitted,

(Signed) F. COGSWELL,
Irrigation Division Engineer,
Irrigation Division No. 1.

IRRIGATION DIVISION NO. 1.

TABULATED STATEMENT OF WATER COMMISSIONERS' ANNUAL DITCH REPORTS FOR THE IRRIGATION SEASON OF 1914.

(1) District	(2) Amount of Appropriation in Second-Feet	(3) Capacity of Ditches in Second-Feet	(4) Length of Main Ditches in Miles	(5) Length of Laterals in Miles	(6) First Day Water Diverted from Natural Streams for Irrigation
1	3,368	2,756	378	314	April 5
2	3,240	2,844	250	69	April 15
3	3,560	3,333	363	1,239	April 25
4	2,509	2,935	228	125	May 31
5	2,494	1,480	243	230	April 27
6	2,212	1,929	291	181	April 1
7	1,620	....	208	....	March 14
8	1,962	1,885	241	388	April 1
9	395	345	54	36	March 8
23		No annual rep	ort received		
46	1,912	1,934	180	....	April 10
47	The Water Co	mmissioner only	reports relative	to 14 ditches o	ut of a total of
	371 decreed	appropriations.	He reports an	abundance of	water for all the
	unreported di	tches			
48	1,430	....	102	....	April 28
64	3,215	3,215	262	739	April 1
65	171	181	Not reported		May 1
Totals	28,088	22,837	2,800	3,321	March 8

IRRIGATION DIVISION NO. 1.

TABULATED STATEMENT OF WATER COMMISSIONERS' ANNUAL DITCH REPORTS FOR THE IRRIGATION SEASON OF 1914.

District	(7) Last Day Water Diverted from Natural Streams for Irrigation	(8) Maximum No. of Days Water Diverted from Natural Streams for Irrigation	(9) Maximum No. of Days Water Carried from Reservoirs	(10) Amount of Water Carried from Reservoirs in Acre-Feet See "Note"
1......................	Nov. 30	239	69	110,723
2......................	Nov. 1	200	202	149,508
3......................	Oct. 5	163	Not reported	99,325
4......................	Oct. 31	154	Not reported	39,862
5......................	Oct. 7	164	Not reported	24,127
6......................	Nov. 11	225	194	24,211
7......................	Nov. 15	247	Not reported	18,583
8......................	Nov. 10	224	125	6,500
9......................	Oct. 31	238	Not reported	11,223
23......................	....	....	....	None
46......................	Sept. 25	169	No reservoirs reported	
47......................	....	....	No reservoirs reported	
48......................	Oct. 10	167	Not reported	390
64......................	Oct. 31	214	128	92,318
65......................	Nov. 15	199	59	94
Totals...............	Nov. 30	267	194	576,864

NOTE.—The quantities in column (10) represent the reported acre-feet in the reservoirs on May 1st, 1914, plus the acre-feet diverted from the rivers for storage from May 1st to Nov. 1st, minus the acre-feet reported in the reservoirs on Nov. 1st, 1914.

District No. 2 includes storage in Standley Lake.

District No. 64 includes storage in Pt. of Rocks and Prewitt Reservoirs.

IRRIGATION DIVISION NO. 1.

TABULATED STATEMENT OF WATER COMMISSIONERS' ANNUAL DITCH REPORTS FOR THE IRRIGATION SEASON OF 1914.

District	(11) Average Daily Amount of Water Diverted by Ditches During Season from Natural Streams for Irrigation Second-Feet	(12) No. of Acre-Feet Diverted by Ditches During Season from Natural Streams for Irrigation	(13) Total No. of Acres That Can Be Irrigated See "Note"	(14) Crops Irrigated, Etc. Alfalfa	(15) Crops Irrigated, Etc. Natural Grasses
1	1,406	326,354	148,600	26,100	13,200
2	1,007	296,296	92,816	24,583	3,692
3	1,378	316,449	391,690	66,836	6,790
4	559	133,548	113,810	31,200	725
5	436	113,875	108,694	31,520	5,590
6	672	114,060	94,102	34,180	9,630
7	368	110,921	130,435	35,195	6,490
8	539	187,607	122,290	17,271	1,498
9	137	36,848	12,357	4,970	273
23					
46	1,577	224,384	89,915		50,954
47					
48	422	55,273	10,784	6	5,213
64	987	211,269	101,515	31,810	21,830
65	96	15,668	3,779	1,187	1,272
Totals	9,584	2,141,546	1,420,787	304,858	127,157

NOTE.—The quantities given in columns (13) to (25), represent the total acreage that can be irrigated or was irrigated, whether the ditches only used the natural flow of streams, or used river and reservoir water combined. The total amount of water used in any district, except in Districts Nos. 3 and 7, will be found by adding together the "No. of Acre-ft. Diverted by Ditches During Season from Natural Streams," given in column (12) and the "Amount of Water Carried from Reservoirs in Acre-Feet," as given in column (10). In District No. 3, 20,308 Acre-Feet were diverted from Districts Nos. 47, 48, and 51. Also an unknown amount of reservoir water was used. In District No. 7, 476 Acre-Feet were diverted from District No. 51 and used by the Golden City and Ralston Creek Ditch.

IRRIGATION DIVISION NO. 1.

TABULATED STATEMENT OF WATER COMMISSIONERS' ANNUAL DITCH REPORTS FOR THE IRRIGATION SEASON OF 1914.

CROPS IRRIGATED FROM CANALS IN ACRES, SEE "NOTE" BELOW

District	(16) Cereals	(17) Orchards	(18) Market Gardens	(19) Potatoes	(20) Sugar Beets	(21) Other Crops
1	26,545	214	40	2,528	14,773	10,953
2	32,542	226	4,342	2,268	12,320	2,761
3	92,057	2,396	1,643	29,040	42,755	4,050
4	53,640	1,700	135	2,745	15,995	2,675
5	38,570	1,204	917	200	10,160	1,290
6	33,865	2,056	864	405	8,440	1,818
7	43,705	3,995	10,585		700	70
8	16,666	3,378	1,590	200	574	5,510
9	4,273	204	44		235	29
23						
46	505		1			
47						
48				6		
64	17,090	136	68	1,430	15,938	745
65	484	41	32	26	37	200
Totals	359,942	15,550	20,261	38,848	121,927	30,101

IRRIGATION DIVISION NO. 1.

TABULATED STATEMENT OF WATER COMMISSIONERS' ANNUAL DITCH REPORTS FOR THE IRRIGATION SEASON OF 1914.

CROPS IRRIGATED FROM CANALS IN ACRES					COST—DOLLARS		
District	(22)	(23) Cabbage	(24)	(25) Total Irrigated	(26) Superintendence	(27) Repairs	(28) Improvements
1				94,353	14,580	7,900	11,400
2		857	Celery 107	83,698	17,910	6,755	3,130
3				245,567	25,405	20,850	20,700
4			Peas 1,485	110,300	10,650	800	7,575
5			Peas 776	90,227	9,705	3,490	3,135
6				91,258	3,600	11,880	7,000
7				100,740	Not reported		
8			Celery 60	46,747	3,650	6,558	605
9	Timothy 202	15	Corn 39	10,284	2,436	1,400	787
23							
46	Pasture 38,455			89,915	Not reported		
47							
48				5,225		402	226
64				89,047	6,450	5,210	2,735
65				3,278		633	296
Totals	38,657	872	2,467	1,060,639	94,386	65,878	57,589

Pueblo, Colo., December 15, 1913.

Hon. John E. Field,
State Engineer,
Denver, Colo.

Dear Sir: I have the pleasure of handing you herewith my report for the year ending November 30, 1913, for Division No. 2, comprising the drainage basin of the Arkansas River and all its tributaries within the State of Colorado, divided into 13 Districts embracing more than one-fourth of the entire state.

The soil within the boundaries of this Division in richness and productiveness is second to none in the world; every variety of fruit or vegetable indigenous to this latitude will grow most bountifully here.

I will briefly mention here, although foreign to irrigation, yet vital to this Division, the great wealth of mineral,—gold, silver, lead and zinc, together with enormous coal fields, and oil-producing wells for more than 25 years; the mineral production greatest of any in the Union, the best of building stone and beautiful marble. The great feeding grounds for tens of thousands of cattle, sheep and hogs; large numbers are finished in the fattening pens throughout the valley for local and outside markets, as the local packing plant here consumes over fifty thousand hogs, cattle and sheep in proportion. The best of local markets for not only a limited amount of live stock, but for truck garden products.

Whilst the last season was a most prosperous and productive one, the precipitation was much below the normal, so distributed throughout the season as to produce good results. Beginning the season without a full reservoir in the entire Division, and many with but a very meagre amount with the above conditions, and no storage whatever during the entire season, one of the shortest on water ever known,—we had most bountiful and excellent yields of all crops and many record makers.

SNOWFALL, RAINFALL, AND RUNOFF

The rainfall and snowfall records for the past year show a result considerably under the normal. Taking the year from Dec. 1, 1912, to Dec. 1, 1913, the total rainfall at Pueblo totals 9.25 in., which is about 77% of the normal. The precipitation in June was less than half the normal, being 0.66 in. In July several very heavy rains, totaling 3.12 in. brought the precipitation for the month much above the normal of 1.97 in. August showed a precipitation of 0.87 in. while the normal is 1.57 in.

A comparison of the snowfall records at Leadville, Tennessee Fork, Lake Fork, and Twin Lakes, with those for the previous winter, which were normal, show the supply to have been about 2/3 of the normal.

The total runoff at Canon City for the past season, April to November inclusive, was 345,000 acre feet, which is 64% of the runoff for 1912. The records at Granite showed 84%, at Salida 79%, and Pueblo 57% of the runoff for 1912.

COMPARISON OF 1913 WITH 1912

The reports from Districts 11, 12, 14, 17 and 67, which lie along the main river and may be taken as approximately correct, show a total diversion of 838,400 acre feet. The report from the same districts for the previous year of 1912 show a total diversion of 1,212,400 acre feet. The diversions of 1913 are about 69% of those of 1912. The total acres irrigated by these same districts in 1912 was 373,574 acres and in 1913 was 364,164 acres or 97.5% of the previous year.

A comparison of the past year with the previous year shows a decrease of about 20,000 acres in alfalfa, a decrease of 20,000 acres in cereals and an increase of 7500 acres in sugar beets.

FINANCIAL

If the office of the Division Engineer is to serve the purpose for which it was created, it is absolutely essential that a more liberal appropriation be provided; the abolition of railroad passes, the demand for more frequent and accurate measurements of ditches and streams and necessity for more frequent use of telephones has raised the expense of the office to a point where the $500.00 now allowed is entirely inadequate. During the past season this amount was exceeded by $135.00, which represented a personal loss to the Division Engineer in charge. The amount appropriated should not be less than $1000.00; and we further recommend the State furnish each Division Engineer an automobile, in view of the increased expense of traveling due largely to the abolition of passes, &c. It is the intention of the office during the coming season to make a charge of $10.00 per day and expenses for all canal rating. During the past season 28 ratings were made. At the above rate this would amount to $260. per year, and it is suggested that this amount be credited to the Division office to be expended for necessary expense and betterment of service.

OFFICE FURNISHINGS

In the laws of the 18th General Assembly it was provided that the Secretary of State provide and furnish the Division Engineers offices with the necessary furniture, filing cases, etc. required to properly care for the numerous letters and records. The law, as enacted, failed to provide an appropriation for this purpose. It is hoped that the next legislature will not overlook this important matter. Such furnishings as are now in this office are provided by the Division Engineer. The records collected by the office, consisting of canal ratings, stream gagings, reservoir and canal reports, copies of decrees, capacity tables, letters, etc., are of considerable value and can only be properly preserved in suitable filing cases. The cost of the necessary cases would not exceed $100.00.

FRUIT

The apple and cherry crop was the best ever known in the valley,—size, color, flavor and yield never excelled in any land. The great value of pruning and spraying has begun to dawn on our people and thus the fruits of vigorous application of each has been most satisfactory and remunerative. Some districts have already marketed over one hundred thousand dollars worth of apples, and there are many such districts throughout the valley.

MELONS

The cantaloupe and melon crop was very heavy and most satisfactory returns obtained.

CROPS

Of the more than one half million irrigated acres of this Division there was 185,274 acres of alfalfa yielding 741,096 tons at $8.00 (minimum) $5,928,768—84896 acres in cereals, nearly 20,000 acres in orchards, 50867 acres sugar beets, bringing to the farmer alone more than four million dollars. The tonnage and per cent of sugar was above the average, some growers received as much as $8.00 per ton sliding scale based on percent sugar.

SEED AND TRUCK GARDENING

There is a large acreage devoted entirely to growing seeds of all kinds for truck gardeners et al sold at wholesale throughout the country. Some of the best paying crops are celery, cucumbers, onions, cabbage and tomatoes; during the summer months they are shipped in car lots to many states east and south.

CANNING FACTORIES

The several canning and pickling factories were supplied to capacity during the season.

ALFALFA MEAL MILLS

The alfalfa meal mill has proved a success, advanced the price of alfalfa,—a short haul for the farmer, and saves the price of baling.

INTENSE FARMING

The value of intense farming is shown by the great number of good homes made possible on 5, 10, 20 or 40 acres, with modern equipments, affording comfort, with many luxuries. This can be done with any one of a number of different crops. There is no other investment of like amount that will produce the above.

CONDENSED MILK PLANT

One of the most important enterprises ever located in this State is the Helvetia Condensed Milk Plant at Lamar, which will begin active operations about January 5th, 1914,—a "capacity of 5000 cows." One can readily imagine the great importance of this industry. It is a well known fact that prosperity follows the cow.

DUTY OF WATER

The duty of water, for irrigation, is the amount of land a given amount of water will irrigate successfully in the growing and maturing of any particular crop. The demand for water by the various ditch, canal and reservoir managements is becoming more insistent and constant each year. The reason of this is apparent.

The various ditch managements have spent much money and time each year since the ditches were built in bringing settlers (either land purchasers or renters) on to the lands to be irrigated from the respective ditches. Even with the most constant efforts to settle up the territory and subdue the lands to be irrigated, and even with unlimited means available for settling up the lands, the process has been slow. Gradually, however, the acreage of land actually in cultivation and under irrigation from the various canals and reservoirs has increased from year to year until now practically the maximum acreage is being irrigated under each irrigation system. As the acreage has increased, the need for water has become greater until now practically every irrigation enterprise in the Arkansas Valley needs and demands its full appropriation of water all the time; whereas in earlier times, a constant flow of the full appropriation of water was not always needed.

WATER COMMISSIONERS' SHEET

I would suggest that columns 3, 7, 8, 9, 10, 11, 25, 26 and 27, in the sheets used by the Water Commissioners for their annual reports, be eliminated, as they mean nothing to them and are not understood sufficiently to give them place. That columns 6 to 14, inclusive, in reservoir sheets, be left off. I would recommend that all quantities be expressed in acre feet, and that the date of priority be added. Also that the field books used by the Commissioners can be used 2 or 3 years each, as they are not nearly used up in one season, and much expense can be saved, as there is plenty unused space to accommodate from one to two years more.

WATER COMMISSIONERS

There are eleven water commissioners in this Division, five on the main river and six on tributaries. It is again urged as in previous reports that the commissioners be chosen by Civil Service and paid directly by the State. It is further recommended that the commissioners in Districts 12, 14, 17 and 67 be paid $1,500.00 per year and that the remaining commissioners in Districts 10, 11, 13, 15, 18 and 19, be paid $1,000.00 per year. If deputy commissioners be needed these should still be paid directly by the counties, as is now the case. This arrangement would cost the State $13,000.00 in salaries for Division No. 2. It is believed that this method would greatly increase the efficiency of water distribution and commissioners would then be chosen on a basis of merit and removed from local influences. Further, each water commissioner or water officer should wear a star, or some emblem of authority, at all times while employed in the duties of his office.

GAGES AND MEASURING DEVICES

There is a tendency of headgate keepers to hold their ditches from 0.05 to 0.10 above their correct gage height in order that they may not give their ditches the "worst of it." This, together with the fact that ditch owners naturally will not request a new rating when they know their ditches are carrying more than their due priority, results in a diversion of probably 10% more water than the records show. Under present conditions it is very probable that the last ditch out should be receiving its priority. To properly see that all ditches receive their exact rights it is recommended that ditches carrying over 25 second feet of water be required to install self registering gages that will record a week's flow; this installation would cost each ditch about $100.00. The water commissioner should then be instructed to make the round of their ditches each week, taking off the past week's chart and inserting a new one. The records should be filed in the office of the Division Engineer. Furthermore, the commissioners should be provided with a current meter and instructed in its use. They could then check the ratings of their ditches at regular and frequent intervals.

We have associated with us in the office Mr. B. S. Clayton, a most competent hydrographer, from the State Engineer's Office; with his able assistance this office was never better equipped to meet the demands and requirements of the water consumers than now; we are able to make measurements of streams and ratings without any delay whatever. The great benefit of this can be readily understood by the water consumers.

In conclusion I desire to thank the State Engineer for his courteous treatment and substantial advice on all matters pertaining to this office. I also wish to thank the several water commissioners in this Division, as they have been most active and faithful in the discharge of their duties, giving at all times accurate and reliable information.

Respectfully submitted,

(Signed) E. R. CHEW,
Irrigation Division Engineer.

IRRIGATION DIVISION NO. 2.

WATER COMMISSIONERS' RESERVOIR REPORT FOR THE IRRIGATION SEASON OF 1913.

District No.	Location	Source of Supply	Capacity in Cu. Ft.	Quantity Water in Reservoir May 1st, Cu. Ft.	Quantity Water in Reservoir Nov. 1st, Cu. Ft.
10	El Paso Co..........	Fountain River......	2,260,905,800	289,211,800	23,582,200
11	Lake and Chaffee....	Ark. Riv. and Tribs..	1,201,809,559	909,144,500	527,009,000
12	Fremont............	Ark. Riv. and Tribs..	750,452,000	363,470,000	349,605,000
13	....	....	....	....	11,979,000
14	Pueblo Co..........	....	1,385,272,581	416,825,640	....
15	Pueblo Co..........	St. Charles..........	270,000,000	171,442,391	267,460,711
16	....	....	....	....	....
17	Otero..............	Ark. River	24,933,825,560	1,108,908,000	43,560,000
18	....	....	....	....	....
19	Las Animas Co......	Purgatoire..........	965,046,220	61,838,000	23,628,000
	Totals.........	....	31,767,311,720	3,321,840,331	1,248,623,911

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Hon. John E. Field,
State Engineer,
Denver, Colo.

Dear Sir: I herewith submit my report for the fiscal year

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TION SEASON OF 1 WATER DIVISION NO. 2

S IRRIGATED FROM CANA

District No.		Market Gardens	Potatoes	ks, Source of Information, Etc.
10	8	160	....	....
11	7	217	497	0 hogs; col. 22—peas; 23—cattle.
12	1	349	33	
13	7	23	....	....
14	8	2893	2	ers and tomatoes; 23—cantaloupes and melons.
15	4	....	....	....
16	0	220	....	....
17	1	1725	23	3—cantaloupes, 400 ac. cucumbers.
18	....	....	....	....
19	2	428	....	cattle.
49	....	....	....	....
66	....	....	....	....
67	0	205	....	ol. 23—beans.
	8	6220	555	

the above is a sum ion Division Engineer.

wheat reported 20 bushels, oats 45 bushels, corn 40 bushels.

In natural grasses or blue stem, 42,000 acres; this class of hay averages about 1½ tons per acre, and always has a ready

WA

Distri No.
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Hon. John E. Field,
State Engineer,
Denver, Colo.

Dear Sir: I herewith submit my report for the fiscal year ending November 30th, 1914, for Division No. 2.

The greatest snow storm known in this Valley began the first day of December, 1913, accompanied with lightning and thunder and slight rain; from 20 to 30 inches covering the entire Division, in the Mountain Districts from four to six feet. This snow lasted the entire winter, going off slowly, leaving the ground in the very best condition for plowing and seeding.

Rains began in March, continued intermittently throughout the entire season; early planting was somewhat retarded by rain. The entire season was the wettest ever known in this Division, in fact, too much water. By the too free use of irrigation water together with the rains, much damage was done to growing crops, also in harvesting same.

There were numerous heavy rains and many disastrous floods in the tributaries.

All reservoirs were filled to full capacity and were not called upon during the season for water; practically no water from the reservoirs was used for irrigation during the season.

The flow of the streams, with the rain-fall, was abundant for all purposes. The average rain-fall at this point (Pueblo) was 18 inches; in several other locations in the Division it was 22 inches. Indeed, "Dry Farming" was a complete success, producing some of the finest crops ever grown in the State, particularly grains of all kinds, and in many instances, remarkable yields. Mr. Teller had 1000 acres in wheat, just west of the City, in one tract, first year on sod, that made 27½ bushels per acre; 40 bushels reported from several locations.

There was more rain, more water in every stream, than was ever known before; even the oldest inhabitant acknowledged the unprecedented snow and the rain-fall of the past season and duration of the same.

The acreage in sugar beets was 40000; the tonnage very high; sugar content about average; too much water for banner crop.

In alfalfa, 214682 acres; some very peculiar circumstances governed this crop; for instance, in many localities three good crops and a fair fourth; in others, only two, owing to rains; so that the crop throughout the Valley would not average over 3½ tons per acre or 751387 tons at stack price of $6.00 would be $4,508,312.

In cereals 84162 acres; many reports of 50 bushels of wheat (and often more) per acre; oats 100 bushels; corn 80 bushels, some instances more. The above maximum yield; the minimum, wheat reported 20 bushels, oats 45 bushels, corn 40 bushels.

In natural grasses or blue stem, 42000 acres; this class of hay averages about 1½ tons per acre, and always has a ready sale at a minimum of $12.00, and maximum $24.00. Season and climatic conditions govern prices.

In orchards 18000 acres. The yield this season was not so heavy as last, yet it was a superior crop of fine quality.

We have 7000 acres in market gardens, not only supplying our home markets, but many states receive their supply during certain months from these gardens.

In other and diversified crops there are 41000 acres. This does not include 12000 acres of melons and seed crops of all kinds for market gardens, etc. These seeds not only supply a large part of our domestic trade, but are exported in car lots; seed crops are proving very remunerative; many farmers are turning their attention to these crops solely.

A careful estimate of the value of the smaller fruits, such as cherries, plums, prunes, bush fruits, berries and grapes, together with celery, vegetables and honey, is $2,000,000. All canning and pickling factories were put to their utmost capacity.

The stock industry has assumed gigantic proportions; more than 600,000 lambs and sheep were fatted, about 20000 head of cattle and ten thousand hogs, shipped to the packing houses of Pueblo, Denver, and the eastern cities. Raising of mules and draft horses is growing more important each year. This stock is of a most superior quality.

A great stimulant in the dairy industry is the building of a large condensary at Lamar, and a number of creameries and cheese factories in other sections. This means the progressive farmers who are building silos; only a year or two ago there were only one or two, now they are numbered by scores and are to be seen everywhere; they are easily filled as the farms produce abundance of fine ensilage, the dry farmer uses cane, milo, maze, kaffir and kindred crops, as these crops are rarely a failure.

Thus closing one of the most fruitful years in the history of the Valley. Were I to indulge in legal suggestions it would be but a repetition of former reports. That other laws are badly needed none will deny. Owing to the great increase in population, new irrigation projects, with the old, the duties of the water officers increase proportionately. The demands on this office have increased at an alarming rate. There is a crying need for a clerk and stenographer, and an increase in expense account; ten or fifteen years ago $500.00 per annum was all right; twice that, with a good stenographer, is demanded, that even will barely suffice the needs.

In closing I wish to mention, the valuable assistance given the administration of this office, by Mr. Bunger, Hydrographer and Deputy State Engineer; since April first he has made sixteen complete ratings on ditches, thirty-two check measurements, and fifty-eight measurements on the Arkansas River and its tributaries. This has been a difficult year to obtain accurate ratings on most of the ditches in this Division owing to extremely sanded conditions, caused by numerous floods, occurring oftener and more disastrous than previous years. The ratings on the river station remained fairly constant, especially at Pueblo and "The Oxford Farmers Dam"; at no time did the measurements vary more than 10% from the curves used to determine the rating tables. These stations were most valuable in the administration sale at a minimum of $12.00, and maximum $24.00. Season and climatic conditions govern prices.

In orchards 18000 acres. The yield this season was not so heavy as last, yet it was a superior crop of fine quality. [illegible]

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	Total No. of Acres That Can be Irrigated	Alfalfa	Natural Grasses	
	13918	4442	4060	
	42347	5312	12864	gs, 3480
	34025	7306	2022	
	19836	1927	13990	
	126105	51977	2146	
1	7080	2639	1162	
1	115442	15619	3817	
0	198405	79980	2960	
	42320	14167	8007	p, 5000
38	106613	32953	4850	
19	706091	216609	55878	

taries. This has been a difficult year to obtain accurate ratings on most of the ditches in this Division owing to extremely sanded conditions, caused by numerous floods, occurring oftener and more disastrous than previous years. The ratings on the river station remained fairly constant, especially at Pueblo and "The Oxford Farmers Dam"; at no time did the measurements vary more than 10% from the curves used to determine the rating tables. These stations were most valuable in the administration of the water. There is need of a good station at La Junta, or preferably below the mouth of the Purgatoire at Las Animas. The only way a station could be secured would be to build a permanent control across the river.

This office, in conjunction with the "Ditch Association", has been able to keep a much better check on the tributaries this season than ever before, necessitating frequent measurements, in fact, after each flood a new rating is necessary.

Perhaps it is of interest to know that in this Division there is 13000 sec. ft. of water decreed, 706091 acres can be irrigated. 475,892 acres were irrigated, average daily amount of water used 4500 sec. ft., in round numbers, or approximately 1.70 acre ft. per acre.

Respectfully submitted,

(Signed) E. R. CHEW,
Irrigation Division Engineer.

Alamosa, Colorado, November 22, 1913.

Mr. John E. Field,
State Engineer,
Denver, Colo.

Dear Sir: I herewith submit to you my annual report, as Irrigation Division Engineer, for Division No. 3.

There has been less water in this Division this year than I have seen before. We have not had any high water at all this year, which is a very unusual thing to happen. If it had not been for the reservoirs the crops would have suffered a great deal, but we had the reservoirs to draw upon, and the crops were very good, all but the native hay, which is short, on account of having no flood water, which the hay land needs to make a good crop.

I have visited nearly all the districts in the Division, and have found most of them handled fairly well by the Commissioners.

In District No. 20 the Commissioner, F. C. Spencer, has done very well for a new man. This District is very large and is too much for one man to handle, and will be more difficult to handle when all the reservoirs are completed. There are five reservoirs completed now and there is work being done on three more. The S. L. V. Irrigation District Reservoir is a very complete proposition and is very well handled by the Directors.

In District No. 21 the Commissioner, Thomas McCunniff, has had some trouble on account of shortage of water in the Alamosa River and the La Jara River, and on account of a number of the ditches not having headgates and measuring flumes. This difficulty will be overcome next season. The crops in this District were very good with the exception of some on new land that was seeded very late in the season.

In District No. 22 there has not been any trouble, with the exception of one or two small disputes, which were settled satisfactorily to all concerned. Mr. W. W. Christensen, the Water Commissioner, is a new man, but has done well. The crops in this District were very good, considering the shortage of water, in the latter part of the season.

In District No. 24, the Water Commissioner, Mr. J. P. Sanchez, has not had so much trouble as in former years. The Mexican people and the Costilla Estates seem to have got together and are working for the best interests of all concerned. Most of the crops in this District were very good.

In District No. 25, the Water Commissioner, Mr. John L. Charles, has reported no difficulties. This District is a very prosperous one and the crops were good. Mr. Charles seems to have the faculty of getting along with the water users very well. There are never any complaints.

In District No. 26, Mr. Alex Russell, the Commissioner, seems to get along without any trouble, as he has not asked for any assistance from me. The District is settled by old timers in the valley. They are mostly wealthy and have plenty of cattle, sheep and horses. If the newcomers in the valley would follow their example they would all do well.

In District No. 27, Mr. A. N. Coolbroth, the Commissioner,

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Alamosa, Colorado, November 22, 1913.

Mr. John E. Field,
State Engineer,
Denver, Colo.

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District No.	Number of Priorities	Amount of Appropriation Second-feet	Length of Main Ditch, Miles	Average Number of Days Water from Natural Stream	Average Daily Amount of Water During Season Sec. Ft.	Improvements
20	176	5731.	289.	96.	1843.	13,038.00
21	88	1588.75	712.	47.61	1220.	2,305.00
22	108	3832.93	360.2	68.65	....	1,090.00
24	35	369.99	93.2	67.36	256.38	575.00
25	60	420.91	159.80	96.	124.5	200.00
26	193	553.79	107.25	80.4	314.67	170.00
27	86	134.29	21.75	103.39	82.48	175.00
35	6	95.	20.	103.	....	....
Totals	752	12725.74	1762.84	....	....	14,553.00

In District No. 25, the Water Commissioner, Mr. John L. Charles, has reported no difficulties. This District is a very prosperous one and the crops were good. Mr. Charles seems to have the faculty of getting along with the water users very well. There are never any complaints.

In District No. 26, Mr. Alex Russell, the Commissioner, seems to get along without any trouble, as he has not asked for any assistance from me. The District is settled by old timers in the valley. They are mostly wealthy and have plenty of cattle, sheep and horses. If the newcomers in the valley would follow their example they would all do well.

In District No. 27, Mr. A. N. Coolbroth, the Commissioner, has not reported any trouble. He seems to handle this District with good satisfaction to the water users. The crops in this District were very good, as usual.

In District No. 35, Mr. I. N. Janney, the Commissioner, has paid no attention to the work. What work has been done was by Jessie Denton, a deputy. There have been some disputes, which were settled without much trouble.

In my forty years residence in the valley, I have never seen so little water in the valley as there was this season, yet the crops have been very good. It convinces me that the farmers have been using too much water heretofore. With two or three more reservoirs, at the headwaters of the streams, the San Luis Valley would never suffer for want of water for their crops, and crop failure would never be known in the San Luis Valley.

Respectfully submitted,

FREDERICK W. SWANSON,
Irrigation Division Engineer, Division No. 3.
Alamosa, Colorado, November 30, 1914.

Alamosa, Colo., Nov. 30, 1914.

Mr. John E. Field,
State Engineer,
Denver, Colo.

Dear Sir: I hereby submit my Annual Report as Irrigation Engineer Division No. 3. The Annual Reports of the several Water Commissioners, and tabulations for the entire Division during the Irrigation season of 1914.

There has been no extreme high water during the season just closed on any of the streams but a very even flow during the whole season. There has only been a very few small ditches closed down and only for a few days at that, this was because the Water Commissioner, being a new man, did not understand how to handle the District.

The Valley has had one of the most prosperous seasons that I have seen for many years. The farmers have had all the water that they could use, and some to spare.

The crops throughout the valley were extra good.

There was feed enough raised to fatten thousands of cattle, sheep and hogs.

In District No. 20, there are now about six Reservoirs completed, which will furnish all the water that they will need, for all time to come.

The farmers in the District are very prosperous, they are building themselves some of the finest homes that can be seen in any part of the country.

In District No. 21, there are two Reservoirs, which have done good service during the season just closed. The people in this District have put in crops, a great amount of new land this year, and have had good crops. As this is about the oldest settled portion of the valley, the farms are in better condition than any other part of the Valley that I know about.

There was some trouble about water in this District, in the early part of the season, the reason for this was that the Water Commissioner was a new man.

District No. 22 had all the water that they could use, and the crops were extra good, so everybody was happy. The farmers in this District are building a great many silos, which will make them all rich in a few years.

District No. 24, which is in the Southeastern part of the Valley has one of the finest reservoirs in the State, if not one of the best. It is called the Sanchez Reservoir, and was built by the Costilla Estate and Developing Company, it covers some of the finest land in the State. They have had plenty of water for all purposes, and some to spare. They have stored a great deal of water, the Reservoir has a capacity of 104,000 acre feet.

District No. 25, is a small District, but is very prosperous, they raise a great deal of hay and stock feeding is the principal business of the District.

The farmers are doing a great deal of improvement, that they may be able to handle the water with more economy.

If the water commissioners were instructed to gather crop reports early in the season, I think that their reports would show at least one-fourth more crops in the valley.

Respectfully submitted,

(Signed) FREDERICK W. SWANSON,
Irrigation Division Engineer, Division No. 3.

Alamosa, Colo., Nov. 30, 1914.

Mr. Jo[redacted]
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The farmers are doing a great deal of improvement, that they may be able to handle the water with more economy.

District No. 26, is looked after by Commissioner Alex Russell, and he seems to get along with all the water users in the District,

sioners do not commence to get the data early enough, but wait until the season is over and then try to get the crop report, this is very hard to do so late in the season.

If the water commissioners were instructed to gather crop reports early in the season, I think that their reports would show at least one-fourth more crops in the valley.

Respectfully submitted,
(Signed) FREDERICK W. SWANSON,
Irrigation Division Engineer, Division No. 3.

Alamosa, Colo., Nov. 30, 1914.

Mr. Jo [redacted]
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District No.	No. of Priorities	Amount of Appropriation Cu. Ft. Per Sec.	Length of Main Ditch, Miles	Average Daily Amount of Water (Cu. Ft. per Sec.) from Natural Stream	No. of Acre-Feet Used by Canal for Season from Natural Stream	Total No. of
20	268	4660	429	111	1680	44[illegible]39
21	86	1702	333	63	1069	6[illegible]
22	103	4019	215	98	....	8[illegible]25
24	84	1682	81	151	114	1[illegible]
25	50	396	159	93	188	5[illegible]
26	204	572	106	92	410	3[illegible]75
27	87	149	25	99	102	[illegible]55
35	49	290	....	....	....	....
Totals	931	13470	1348	707	3563	71[illegible]04

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the finest land in the State. They have had plenty of water for all purposes, and some to spare. They have stored a great deal of water, the Reservoir has a capacity of 104,000 acre feet.

District No. 25, is a small District, but is very prosperous, they raise a great deal of hay and stock feeding is the principal business of the District.

The farmers are doing a great deal of improvement, that they may be able to handle the water with more economy.

District No. 26, is looked after by Commissioner Alex Russell, and he seems to get along with all the water users in the District, as he gives them all the water they want.

This is a very prosperous District, and the farmers are all making good.

District No. 27, is taken care of by A. N. Coolbroth, and he seems to give them good satisfaction, and there has not been a complaint made by the water users.

The crops were very good and there was plenty of water for all.

District No. 35 has no Water Commissioner, as Mr. I. N. Janney has left the District. It was looked after by Mr. Steve Calkins, as deputy, he is a new man. He has done fairly well for the first time, and by another season will make a good Commissioner.

There is one reservoir in this District, owned by the Trinchera Estate people, and in order to handle this District properly, next year they will have to put in their measuring flumes and gauge-rods, which they have not done yet.

I haven't been able to get any report from District No. 35.

In conclusion, I will say, as I have done in former reports, that the reports from the water commissioners are not complete, and they never will be, until there is a change in the manner of appointing of the water commissioners, and also in their pay.

I will say, that the water commissioners have done the best that they could, under the circumstances. The water users are very slow in complying with the law in regard to the headgates and measuring flumes.

The water users have all been served with notices, this year, that they must put in their headgates and flumes, or not get any water next year. A great many have already complied with the order, and I think many more will do so before next season.

It will be a great help to the water commissioners.

I think that the valley will be in better shape for the distribution of water, next season, than it has ever been.

In regard to crop reports from the water commissioners, I will say, that they are not very reliable, one reason for this is that the farmers do not seem to want to give the commissioners the necessary information and another reason is that the commissioners do not commence to get the data early enough, but wait until the season is over and then try to get the crop report, this is very hard to do so late in the season.

If the water commissioners were instructed to gather crop reports early in the season, I think that their reports would show at least one-fourth more crops in the valley.

Respectfully submitted,
(Signed) FREDERICK W. SWANSON,
Irrigation Division Engineer, Division No. 3.

Montrose, Colo., Nov. 30, 1913.

State Engineer,
Denver, Colorado.

Dear Sir: In submitting my annual report for the fiscal year ending with this date, I shall comply as fully as possible with the statutes governing the same which reads as follows:

"The reports filed with the State Engineer shall include all correspondence for the season on all business and official acts for the season last past, and shall include the reports of the water commissioners as hereinafter defined, and other data and information."

By an Act of the Eighteenth General Assembly, the office of this division was located in Montrose, and a portion of that act reads as follows:

"The Secretary of State shall provide a suitable office for each Division Engineer, and shall supply him with suitable furniture and office equipment for the proper transaction of the business and preservation of the records of the irrigation division." (L '11, p 469, Sec. 1)

After the above section went into effect, I made repeated efforts to have the Secretary of State comply with the law by furnishing an office for this division, so that the office might be moved from Delta to Montrose as the law required. How successful I was in getting the Secretary of State to carry out the provision of the law so far as this division is concerned is shown by the following letter which I received from him.

"State of Colorado
Office of Secretary of State,
Denver, Colo., Nov. 13, 1912.

Hon. H. C. Getty,
Division Engineer, District No. 4,
Delta, Colorado.

Dear Sir: I am informed by Mr. Monell, County Clerk of Montrose County, that you requested him to speak to me about furnishing you an office as division engineer, under the statutes creating the office of Division Engineer.

I beg to say that while the law provides that the Secretary of State shall furnish office for Division Engineers, the Legislature failed to make any appropriation to cover this expense and therefore, it can not be done.

I have had several requests from different Division Engineers and have answered them in the same manner that I reply to you.

Yours very truly,
(Signed) JAMES B. PEARCE,
Secretary of State."

On June first of this year the office equipment, which the state did not furnish, was moved from Delta to Montrose, and the office has been maintained, not as provided in the above statute, but from my expense fund.

This division comprises a large extent of territory and each year some important irrigation project is completed, and thereby the work of the engineer of this division is extended.

This season I travelled six thousand five hundred miles in the discharge of my official duties, and the amount allowed for expenses, $500.00 is inadequate to meet office expenses, railroad fare, livery hire, hotel bills, etc. I therefore, recommend that an appropriation be made by the next General Assembly for the proper maintenance of his office.

Through an appropriation of one hundred fifty dollars made by the Nineteenth General Assembly, this office was equipped with a desk, typewriter, etc.

The season of 1913 was the driest in this part of the state that we have known for many years, yet crops were good. A bountiful harvest and fair prices added not a little to the prosperity of this section.

So low did the Gunnison River get, that when the Gunnison tunnel was diverting six hundred second feet of water, at times in August and September there was not to exceed two hundred second feet passing the tunnel headgate.

There were more acre feet of water per acre used under the Gunnison Tunnel project than were used in any part of this division.

In Districts Nos. 40 and 42 the water commissioners handled the distribution of water in very commendable and satisfactory manners. I mention these two districts as they are difficult districts to handle during a dry season.

IRRIGATION DIVISION NO. 4.

REPORTS OF WATER COMMISSIONERS FOR THE IRRIGATION SEASON OF 1913.

The following districts have made no report for this season: 29, 31, 32, 33, 59, 63 and 69.

District No. 28, Commissioner J. Roy Hicks, Sargents, Colo. Mr. Hicks worked a few days only, and the crop report is all that is given:

Total number acres that can be irrigated	19710
Natural grasses (acres)	18213
Alfalfa (acres)	20
Cereals (acres)	156
Potatoes (acres)	18
Total irrigated	18407

District No. 30, Commissioner W. E. Tyner, Durango, Colo.

Amount appropriated (second feet)	272.4
Capacity of ditches (second feet)	223.
Length of ditches (miles)	559.
Average No. days water was used	60
Average daily amount of water used (second feet)	67
No. acre-feet water used	7393
No. acres can be irrigated	11020
Alfalfa	2170 acres
Cereals	4195 acres
Potatoes	96 acres
Other crops	135 acres
Total irrigated	6596 acres
Duty of water in acre-feet per acre	1.16
Spent for repairs	$4800.
Spent for improvements	1100.

District No. 34, Commissioner H. M. Barber, Mancos, Colo.

Amount appropriated (second feet)	1432
Length of canals (miles)	144
Length of laterals (miles)	200
Average No. days water was used	81
Average daily amount used (second feet)	183
Total No. acres can be irrigated	82631
Alfalfa	2759
Natural grasses	1357
Cereals	2505
Orchards	99
Potatoes	149
Sugar beets	14
Other crops	60
Total acres irrigated	6943
No. acre-feet water used	29646
Duty of water (acre-feet)	4.2 per acre
Spent for maintenance	$2361.

District No. 40, Commissioner Charles H. Luellen, Eckert, Colo. This report is notorious for its neatness, completeness and excellency. It is by far the best report ever received by this office.

Amount appropriated (second feet)	509
Capacity of ditches (second feet)	1295
Length of ditches (miles)	409

First day water was used, April 7.

Last day water was used, Sept. 29.

Average No. days used (stream)	100
Average No. days used (reservoir)	60
Cu. Ft. water used from reservoir	1,317,854,896
Average daily amount used for season (second feet)	550
No. acre-feet used for season	139,341
No. acres that can be irrigated	72,403

Alfalfa	21791 acres
Natural grasses	1878 acres
Cereals	6711 acres
Orchards	11485 acres
Market gardens	196 acres
Potatoes	1285 acres
Sugar beets	393 acres
Other crops	820 acres
Total irrigated	44459 acres

Duty of water (acre-feet)		3 per acre
Spent for superintending	$2900	
Spent for repairs	3319.50	
Spent for improvements	2573.	
Total spent	$8792.50	

District No. 41, Commissioner A. J. Baxter, Montrose, Colo.

Amount appropriated this district	716	sec. ft.
Amount appropriated district 62	1360	sec. ft.
Capacity of canals	1590	sec. ft.
Length of canals (miles)	378	
Length of laterals (miles)	256	

First day water used, March 15th.

Last day water used, Nov. 10th.

Average No. days water was used	240.	
Average daily amount used (sec. ft.)	809.5	
No. acre-feet water used	332640.	
No. acres that can be irrigated	96840.	
Alfalfa	18967	acres
Natural grasses	400	acres
Cereals	14210	acres
Orchards	5570	acres
Market gardens	4235	acres
Potatoes	7620	acres
Sugar beets	4470	acres
Other crops	1470	acres
Total irrigated	56942	acres
Duty of water in acre-feet, per acre	5.8	
Cost of superintending	$ 550.	
Cost of repairs	200.	
Cost of improvements	12160	
Total spent	$12910.	

District No. 42, Commissioner Geo. M. Saunders, Mesa, Colo.

Amount appropriated	772.6	sec. ft
Average daily amount (stream)	184.33	sec. ft
Average daily amount (reservoir)	190.	sec. ft
Average No. days used (stream)	93.	sec. ft
Average No. days used (reservoir)	36.	
Amount from reservoir	259,259,320	cu. ft.
No. acre-feet used	56,119	

Crop acreage	Alfalfa	46037 acres
	Natural grasses	1506 acres
	Cereals	2010 acres
	Orchards	809 acres
	Market gardens	48 acres
	Potatoes	370 acres
	Sugar beets	26 acres
	Other crops	2128 acres
	Total irrigated	50934 acres

Duty of water in acre-feet, per acre	1.1

Expended for superintending	$1431.
Expended for repairs	3710.
Expended for improvements	575
Total	$5716.

District No. 60, Commissioner H. C. Browning, Norwood, Colo.

Amount appropriated	168.2	sec. ft
Average amount carried from stream	100	sec. ft.
Average amount carried from reservoir	20.5	sec. ft
Average daily amount used	97.	sec. ft.
Amount used from reservoir	95,000,000	cu. ft.
Acre-feet used for season	13,625	
No. acres can be irrigated	65,400	
Alfalfa	5820	acres
Cereals	4952	acres
Orchards	351	acres
Market gardens	283	acres
Potatoes	186	acres
Corn	245	acres
Barley	890	acres
Timothy	2732	acres
Pasture	2330	acres
Total irrigated	17789	acres
Duty of water in acre-feet, per acre	.8	

Expenditures	Superintending	$2600
	Repairs	2075
	Improvements	3800
	Total	$8475

District No. 61, Commissioner Lorenzo Walters, Paradox, Colo.

Amount appropriated	16.54	sec. ft.

From Utah, from 10 to 50 second feet.

Capacity of ditches	68	sec. ft.
Length of ditches	23	miles

First day used, April 25.

Last day used, November 2.

Average daily amount used	22.16	sec. ft.

No. acre feet used	5056	acre ft.
No. acres can irrigate	4090	acres
Alfalfa	885	acres
Natural grass	74	acres
Cereals	601	acres
Orchards	41	acres
Potatoes	12.5	acres
Other crops	40.5	acres
Total irrigated	1654	acres
Duty of water in acre-feet, per acre	3.	
Cost of operating	$ 648.	
Improvements	225	
Superintending	372	
Total	$1245.	

District No. 62, Commissioner W. O. Brower, Cimarron, Colo.

Amount appropriated	109.	sec. ft.
Capacity ditches	137.	sec. ft.
Length of ditches	51	miles
No acres can be irrigated	7425	acres
Appropriated, but used in District 41	1360	sec. ft.
Alfalfa and timothy	848	acres
Natural grasses	770	acres
Cereals	167	acres
Potatoes	23	acres
Pasture	88	acres
Timothy	104	acres
Total irrigated	2000	acres
Cost of superintending	$1300	

District No. 68, Commissioner John W. Martin, Ridgway, Colo.

Amount appropriated	586.6	sec. ft.
No. acres can be irrigated	2885.	acres
Alfalfa	3133	acres
Natural grass	2269.	acres

Cereals	3867	acres
Orchards	108	acres
Market gardens	62	acres
Potatoes	356	acres
Mixed hay	5704	acres
Timothy	976	acres
Sugar beets	70	acres
Total irrigated	16540	acres
Cost of repairs	$5211.	
Cost of improvements	5834	

In closing this report I cannot refrain from suggesting that the method of paying the water commissioners should be changed. Under the present method, some of the counties are over burdened, the incompetent commissioners are over-paid, the efficient commissioners are under-paid. Under the present system the expense is too great and the results obtained too small.

The Field books and Report Blanks should be revised.

Why not have a more efficient, less cumbersome and more satisfactory method?

Very respectfully,

(Signed) H. C. GETTY,

Irrigation Division Engineer, Division No. 4.

Montrose, Colo., Nov. 30, 1914.

State Engineer,
Denver, Colorado.

Dear Sir: I herewith submit my annual report for irrigation Division No. 4 for the fiscal year ending Nov. 30, 1914. (Here follows copies of letters and correspondence between the Division Engineer and the office of State Engineer, which it is not thought necessary to print.)

The year 1914 was remarkable in many ways. The snow-fall in the mountains was very heavy, and the season was especially noted for the heavy rains during the summer months. The precipitation from Nov. 1st, 1913 to Nov. 1st, 1914 was about fifteen inches and for May, June, July and August about seven inches.

The snow melting was comparatively slow and hence the streams held up late in the season. There was such an abundant supply of water that only about one-half of the water commissioners in the division were called out. Crops were exceptionally good but the prices very low. This was especially true of the fruit crop in Mesa, Delta, and Montrose Counties. Peaches barely paid the expense of picking, packing and shipping. The price received for apples was far below the average, though the quality was never better. Many of the apple growers shipped their entire crop in bulk and as a result realized better porfits than did those who packed their apples.

SOME NEEDS OF THE DIVISION

If seventy-five per cent of the farmers could grow as good crops and farm as well as the other twenty-five per cent are now doing, there would be no talk or failures, or doubt as to meeting water assessments, charges for advertising needed to bring every acre of this fertile valley under cultivation.

More teaching of agriculture and domestic science courses in schools is needed in order to interest the young people in farming and the promotion of good crops and good stock.

More sugar factories would add greatly to its prosperity as there are large returns from the raising of beets. A large indirect return from the feeding of beet pulp to stock and a large return of money to the community thru this pay roll.

Starch factories, vinegar plants, evaporating plants, etc., are badly needed to work up portions of the crops during years of large yields and to work up those grades of produce not suitable or profitable for shipment out of the valleys and which are now going to waste. These industries would tend to keep up prices especially during years of large crops.

Packing plants for handling the pork and poultry raised in the valleys would greatly increase the possibilities of profitable hog and chicken raising.

Another thing badly needed, especially in the Uncompahgre Valley is some uniform system of drainage. Last season about six acre feet of water were used for every acre of crops grown. The same is true of this season. The duty of water in the valley should be greater, as the farms are using entirely too much water. Even if extreme caution is practiced in the use of water, yet there will be necessary some extensive drainage system.

About four years ago, The Elliott-Meaker Drainage Company began operation in the valley. They are experts in their line and have done incalculable service in the way of tile drainage. Mr. Herman Elliott, President of the Company, was formerly Drainage expert of the U. S. Department of Agriculture.

UNCOMPAHGRE VALLEY PROJECT, COLORADO

The Uncompahgre Valley Project consists of ten principal divisions, as follows—The Gunnison Tunnel; which brings the waters of the Gunnison river thru Vernal Mesa into the Uncompahgre Valley to supplement the flow of the Uncompahgre river, which has proven insufficient for the irrigable land in the valley. The South canal, which carries the water from the Gunnison Tunnel to the Uncompahgre river, and is also capable of irrigating about 13,000 acres of land between the South canal and the

Loutzenhizer canal. And the following canal systems which divert or will divert water from the Uncompahgre river to irrigate approximately the acreage shown—

Loutzenhizer canal system	11,200	acres
Selig canal system	22,400	"
East canal system	22,000	"
Garnet Mesa	4,000	"
West canal system	7,200	"
Montrose & Delta system	33,000	"
Ironstone or California system	26,000	"

making a total of approximately 140,000 acres of land to be irrigated of which 30,000 acres was under cultivation and 80,000 under ditches before the U. S. R. S. began work.

In addition to the above, there is contemplated a reservoir at Taylor Park for the purpose of maintaining the flow of water in the Gunnison river, sufficient to supply the needs of the project.

STATUS OF WORK

The Gunnison Tunnel is completed, except for the concrete lining of about 15,000 feet of side walls and arch where tunnel is thru solid rock. The completion of this lining will not be necessary until the full capacity is needed. Experiments were made this summer to determine the true capacity of the Gunnison Tunnel. Collapsible shutters will be required on the diversion weir and a few changes in the tunnel diversion gates before they will be completed.

The South canal system is complete, except for permanent outlet works to replace the present wooden structure where the water empties into the Uncompahgre river. The wooden flume of full capacity, in place of the present temporary flume across the arroya near tunnel No. 5, and a few short laterals, tap boxes, weirs, etc., which will have to be built.

The Loutzenhizer canal system is practically complete except for a few short laterals and a number of tap boxes, etc., necessary to supply water to new lands.

Maurice A. Wogan of Denver, Colorado, has a contract for seven and one-half miles of the Selig canal, and a portion of the lateral systems. The important structures are being built by the Government. This canal system will be finished in time for the 1915 irrigation season, except for the Peach Valley lateral.

About one-half of the lateral system and the principal structures on the East canal system were completed during the year. Reynolds-Ely Construction Company have a contract for excavating twenty-eight and a half miles of lateral systems and the Pacific Pipe and Tank Company for 8,600 feet of 32″ wood stave pipe, which will supply water to Garnet Mesa. This work will practically complete the system.

The Garnet system was transferred to the Government on September first. The headworks and other structures are being replaced and the canal put in shape for the next season.

The West canal system is complete, except, for the connection with the South canal, which will be built during the coming winter.

The Montrose & Delta canal is complete, except for the construction of a few laterals and completion of the headgates, and the replacement of several flumes built before the Government took the system over and enlarged it. The canal system is unable to supply all of the land under it with water, on account of the fact that about ninety second feet of water is being delivered to lands below the Ironstone canal. When the Ironstone canal system is complete, this water can be used on high lands under the Montrose & Delta system.

No work has been done on the California or Ironstone system, except for surveys and investigations.

No work has been done on the Taylor Park reservoir, except for surveys, borings, and studies of the duty of water.

EXPENDITURES

The expenditures on the Project to October 1, 1914 was $5,693,103.00.

ALLOTMENTS

The Secretary of the Interior approved allotments for the year 1914 for $750,861.00.

CROPS

The season was a very good one for the growing of crops. The principal crops grown on the project are alfalfa, potatoes, wheat, oats, sugar beets, apples and onions. The total acreage cropped this year, is approximately 38,000 acres out of 140,000 acres in the project and the crop values are estimated at $1,000,000.00.

DUTY OF WATER

The water is delivered on a continuous flow basis, and often in very small heads, with the result that the duty of water is very low. In 1908, 3.17 acre feet were delivered per acre of crops; in 1909, 4.5; in 1910, 6.25; in 1911, 5.44; in 1912, 4.81; in 1913, 5.43; and this year, approximately 5 acre feet. This duty may be greatly increased in the future by delivering the water on an acre-foot basis and in larger heads.

STATEMENT OF THE IRRIGATION SYSTEM AND WORKS OF THE PARADOX VALLEY IRRIGATION, LAND AND DEVELOPMENT COMPANY, WEST PARADOX VALLEY, MONTROSE COUNTY, COLO.

West Paradox Valley, is located in the western extremity of Montrose County, Colorado, bordered on the West by the Colorado-Utah State line. It is surrounded by precipitous cliffs merging into the La Salle mountains which have an elevation of 13,000 and more feet. It is sheltered in a most peculiar and marked manner, being completely shut in by these red sandstone barriers with the exception of an opening about four miles wide on the south-east. The Rio Dolores river creates East and West Paradox Valley by cutting across it at a point about nine miles from the northwestern extremity. This river comes into the Valley thru a canyon about fifteen hundred feed in depth and goes out thru a similar canyon. Paradox Valley is a great fissure which has gradually filled up with the disintergrations of the ages from its lofty surroundings. The soil is a deep red sandy loam varying in depth from five to seventy-five feet.

West Paradox Valley has an area of about twenty-eight square miles and practically the entire area is susceptible of cultivation and irrigation. It slopes to the southeast about 150 feet to the mile which makes it impossible to utilize the Rio Dolores for irrigation purposes.

The La Salle Mountains, located to the northwest and in close proximity to the valley affords a simple solution of its irrigation problem. The drainage area of a part of the north, the east, and a part of the south water sheds of these mountains has been utilized by means of ditches and the water diverted to the Paradox Water Shed from whence it finds its way through natural courses to West Paradox Valley.

The diversion system has a carrying capacity of 236 cubic feet per second of time and is practically completed with the exception of the Taylor Creek Feeder which is a small ditch to be used in diverting the water from Taylor Creek.

This company also owns a storage system which when completed will conserve 10,000 acre feet of water for late summer and fall use. This system consists of two reservoirs; the Geyser reservoir and the Buckeye reservoir.

The Geyser dam was built during the summer of 1908 to a height of 40 feet with a storage capacity of 1500 acre feet. It failed in the spring of 1909 under the pressure of an unusually heavy runoff. This dam has not been rebuilt. It was constructed by the ground sluice method, the material consisting of a mixture of sand and clay intermingled with a large percentage of stone and gravel. The material was held in place by means of a log cribbing on the down stream slope and was left to find its own slope on the upstream side. It was constructed in a rock gorge twenty feet wide on the bottom and one hundred and thirty feet wide on the top, and its failure was probably due to an insufficiency of material and a lack of proper precaution in establishing a impervious union between the material deposited and the rock faces of the gorge.

The Buckeye dam is being constructed by the hydraulic method. The completed dam will contain 244,336 cubic yards of material. A hand placed rock fill has been carried up on the down stream slope to the present height of the dam, viz; forty feet. A puddle core six feet in width has been carried up thru the center of the dam, and three small puddle trenches on each side of the puddle core are also being carried up. The outlet tube, constructed of concrete, seven feet in diameter and four hundred and forty one feet in length was completed in 1910 and has developed no signs of weakness. The reservoir was filled in the spring of 1914 and was held full most of the season. During this period no leakage whatever has developed. The material used is one-half rock, which is broken up in the borrow pits by means of dynamite and rock hammers. This is placed on both the up and down stream faces by means of the delivery boxes to a deapth of about fifty feet, making a very substantial retainer for the puddle which consists of sand and clay mixed together as deposited.

There has been expended on the project as follows:

Diversion works	$ 14,181.81
Geyser dam, approximated	10,000.00
Buckeye dam	104,444.74
Delivery system	12,139.55
Total expenditure	$140,766.10

The completed project contemplates the irrigation of 13,000 acres of land. Under the facilities now available we can irrigate 7000 acres. At present time less than one-half that acreage is being irrigated.

Owing to the incomplete state of our delivery system during the season of 1914 we were unable to keep accurate record of the water delivered through the various ditches; we, however, kept an accurate record of the water delivered through one ditch which supplied 620 acres of irrigated land. Part of this land is new, being farmed for the first time and part is old cultivated land, partly in alfalfa. This record shows the duty of water on the above named 620 acres during the irrigating season of 1914 to be 1.637 acre feet to the acre. It is possible that 1914 was not an average season and that the duty in average years will run higher.

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SUMMARY (

Total No. of Acres That Can be Irrigated	Alfalfa
....	....
11020	2175
....	....
....	....
1455	1
....	....
....	....
98840	1896
13798	1293
....	....
....	....
....	....
7425	84
....	....
....	....
....	....
13530	510
14295	335
246119	2216
85700	1066
15711	837
....	....
....	685
10470	181
6902	....
....	....
28915	289
....	....

CONCLUSION

In closing this report I desire to again emphasize the necessity of a change in our laws relating to the manner of appointing and paying water commissioners.

The reports of the water commissioners are not what they should be as they are not reported for the entire districts, but for that portion only where the commissioners had work to do.

The report of the commissioner of District 33 is for only eighteen ditches. The report of the commissioner of District 40 is the most complete one received, yet it does not include the Gunnison Valley where the commissioner is seldom if ever needed. The report of the commissioner of District 42 does not include the Grand Valley. If the commissioners were paid by the year and were assignable by Division Engineers to different districts, then when their services were not needed in one district they could be sent to another where they were needed. District No. 40 is in four counties, viz; Mesa, Delta, Gunnison and Montrose, and while Mesa and Gunnison, at present, have no necessity for the services of a commissioner in the territory which is in this district, yet they are compelled, under the law and court decisions, to pay an equal amount with Delta and Montrose counties. In District 62, which is in Montrose, Gunnison and Hinsdale counties, Hinsdale County is unwilling and unable to pay their third of the expense of the water commissioner, hence, he gets only two-thirds of his salary. This district should have been abolished and that part of it lying in Gunnison county should be attached to District 28, the portion in Hinsdale county should be in a district of its own, and the portion tributary to the Big and Little Cimarron rivers should be put in District 41.

Very respectfully submitted,

(Signed) H. C. GETTY,
Irrigation Division Engineer
Division No. 4.

Glenwood Springs, Colorado, Nov. 26, 1913.

Hon. John E. Field,
State Engineer,
Denver, Colorado.

Dear Sir: I herewith submit my annual report for the year of 1913.

The season was unusually late, dry and cold in the spring, with occasional rain and snow storms, and a subnormal supply of snow at the head of the main sources of irrigation, causing shortage of water, in a majority of Districts within this Division.

However, considering this defect, the irrigators seemed to have either economized from prudence, or they were satisfied with the short supply for other reasons. The crops did not suffer as much as was perhaps anticipated and prices for produce compensated in most instances for limited quantities.

A complaint by some associated ditch owners on Roan Creek, District No. 70, was adjusted by the Water Commissioners, preventing the threatened litigation.

A case in District No. 37 where the Commissioner mis-interpreted my instructions in an instance in which an irrigator failed to provide, first: the ditch itself, which was particularly described in the decree by courses and bearings and by reference to artificial monuments like a road and a house; second: measuring devices at points where the alleged ditch, which is really nothing but a sharp depression in the natural ground, empties into and comes out of, a gulch; was also amicably adjusted by me.

In the same District the owner of a power plant situate at the mouth of Gypsum Creek, which he first endeavored to supply from the Eagle River—a rank failure—and later on from Gypsum Creek, complained to me that the irrigators on that Creek used water to excess and to his detriment; the investigations made by the Water Commissioner did not satisfy him, and I then measured every single ditch along that creek, and found indeed an excess of 3.5 c. s. f. which had been applied on lands not described in decrees for from three to twenty-eight years prior to the construction of the power plant.

Altho the plant itself was not decreed the owner insisted that he was entitled to the necessary quantity of water to run it anyhow, and, not satisfied with my conclusion he laid the matter before the Governor and before your office.

I have not heard from either of the instances he appealed to, and I would not mention the case at all, if it had not resulted in the appointment of a new Water Commissioner of that District; as the attorney for the owner of the plant expressed himself to me; the refusal of the Commissioner to shut down the irrigation priorities in order to give the power plant the desired supply, resulting in Cimmerean darkness in the Town of Eagle, started an agitation for the removal of the unaccommodating Water Commissioner. This being accomplished, an entire new power plant was built above the intake of the last important ditch upstream, a transmission line was constructed, light shone over Eagle and peace was restored. Whether the interests and effectiveness of the irrigation service was increased in this instance remains to be seen.

The attempt by an irrigator in the same District to use his full decreed supply on the smaller part of his land, during the cutting and gathering of crops on the larger balance, was quickly stopped over his strenuous objections, to-wit: that he had an absolute right to his full decreed priority at all times, whether or not used in the decreed proportion of 1 c. s. f. to 50 acres, and that it took him from four to five days to run one foot over fifty acres.

I mention this fact because the irrigator in this case backed his contention by the fact that he had been a Deputy Water Commissioner for four years and knew all about the law affecting his case.

I have observed on numerous occasions that the figure in the decree standing for the adjudicated quantity is to the irrigator like unto the law of the Medes, without any further reference to statutes, general provisions of the irrigation laws, proportion of quantity to area even as laid down in the decree.

Such an interpretation was also placed in the case of a supply out of an associated ditch on Canon Creek in District No. 39, where one of the part owners insisted that 1.4 c. s. f. being his "absolute priority" was to be applied on forty acres: "He had been so advised by his attorney—" and he added that he was acquainted with a high State officer——.

The long drawn out case of the Rifle Creek Irrigators Association vs. The Mesa Verde Land and Canal Co. ended in an injunction against the latter. This case was under advisement and was heard before your predecessor in office, who overruled by instruction to the Water Commissioner of District No. 39 with respect to exchange of supply effected by pumping water from the Grand River into Rifle Creek above the headgate of the Pioneer Ditch—the oldest priority on that Creek and locally the last ditch down stream.

Rifle Creek is a compensating stream and this fact enabled us to supply out of a visible flow of 33 c. s. f. at the junction of its forks, a quantity of 49 c. s. f. to the ditches between the headgates of the above Company's and the Pioneer Ditch respectively, a distance of about nine miles. On July 30th, 1913 I measured the Creek at its mouth and found over 7 c. s. f. flowing into the Grand River, and within forty minutes thereafter I measured Rifle Creek 2½ miles above the mouth and found a flow of 3.4 c. s. f.

Considering these facts it appeared that the exchange of supply above referred to, impoverished the flow of the Creek for the distance above mentioned, and the direct supply to the Company's Ditch from the Creek in exchange for the water pumped below for the Pioneer Ditch was made the basis for a petition by the Irrigators Association for an injunction against the Mesa Verde Land an Canal Company.

After a trial lasting eighteen days this injunction was granted and made permanent by the District Court under the ruling of the State Supreme Court of 1902 in the case of The New Cache La Poudre Irr. Co. vs. Water Sup. and Stor. Co. (29 Colo. 469, 68 P. 781).

This judgment upholds my first instruction of 1911 to the Water Commissioner.

I desire to again urgently recommend a change in the present mode of appointing Water Commissioners.

At present the choice of this official, depends not so much on his qualifications, which should be: knowledge of one or two simple methods of measuring water; good judgment, firmness of character, impartiality, and a good physical constitution; but on his personal influence to secure the largest number of indorsements for his petition to the County Commissioners, whose recommendations to the Governor is tantamount to appointment; a procedure which is in many cases entirely unsatisfactory and produces appointees who lack the necessary qualifications for their office, and tends to create among the irrigators a contempt for the irrigation laws and lowers the standard of the Irrigation Service.

The Commissioner should qualify under the provisions of the Civil Service Law, should be paid a living wage out of the State Treasury direct, and should be placed under the control of the Division Engineer.

It is also desirable that the succession of instances should be observed so that instruction from your office to the Water Commissioners should pass thru the office of the Division Engineers.

Very Respectfully,

(Signed) THEODORE ROSENBERG,
Division Engineer.

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FROM CANAL IN ACRES

Potatoes	Sugar Beets	Other Crops	
1323	....	334	...
4651	30	110	...
1527	1362	244	...
716	31	482	...
740	230	751	...
59	....	17	}
154	....	....	...
50	161	99	..
1350	....	....	...
4694	43	78	...
1810	1445	187	...
53	....	....	...
802	224	241	}
21	....	23	..
137	....	191	}
40	47	54	..

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Glenwood Springs, Colorado, December 2d, 1914.

Hon. John E. Field,
State Engineer,
Denver, Colorado.

Dear Sir: I herewith submit my annual report for the year 1914:

The irrigation season was late on account of copious spring rains and the application of water for irrigation was sparse for the same reason during June, and in some Districts, and along some capacious creeks, during part of July also.

The abundance of water caused some irrigators really more grief than a limited supply would have done, and I have personal knowledge of actual shortage of crops caused by over-irrigation.

In District No. 38 on one ranch with a record of many years for banner production, the potato crop on over 100 acres total, fell short over 50 per cent; while on an adjoining place the crop yielded over and above normal—the comparative figures being 7.85 and 14.4 tons per acre; the latter result being attained by the smallest possible quantity of water used, while the reverse was the case in the former instance.

In District No. 37 on Gypsum Creek this distinction was more prominently observable. On two adjoining pieces of oats there was water applied seventy-two hours and forty-two days of water respectively. The yield in the first case was 128 bushels, in the second 26 bushels. While the average results thruout the Division were satisfactory and mostly up to normal and above, I believe that more economical handling of water would have raised the total yield.

Rotation and better methods in judging plant food, studying soil conditions under advice of the State Agricultural College experts, etc., have in some instances produced marked increase, while others, where the water was "hogged", continually brought forth subnormal and even negligible results.

With this abundance of water supply it was strange to see one irrigator ask for an apportionment over and above decreed priority, on the grounds of private agreement defining some inchoate rights resulting from labor and antedating the decree, without record proof however (District No. 39). A suit, just started, aims at reversal of decree, dating back to 1884, for similar reasons. In this case the agreement is of record, but does not appear to have been introduced in the adjudication proceedings, as the decree itself is silent with respect to it (District No. 38).

A case of unlawfully raising a headgate (District No. 45) was tried in the District Court before a jury and the defendant was found not guilty. The custom of local Justices to treat similar offenses rather leniently, especially in one where the defendant raised his headgate twice on the same day and was fined

$1.00 and costs and the fine remitted (!) caused the Deputy Water Commissioner to file direct information with the District Attorney with the result first mentioned.

The Commissioner in District No. 58 served notice on a coal company to stop dumping mine waste into and polluting the water in Oak Creek, used for domestic and stock watering purposes, and the nuisance was abated.

The Deputy District Attorney at Steamboat Springs was ready to proceed against the offending party and his readiness was really the main cause of the abatement.

A perpetual injunction by the District Court was granted (District No. 45) in the case Grove vs. Gant, where the latter attempted a change of diversion from a point upstream from the two headgates of the Grove Ditches to a point between the two headgates. The petitioner showed that the attempted diversion would damage him, since the contemplated ditch would absorb and divert the seepage from his upper ditch and from the creek itself—which runs erratic between gravel banks—and which seepage had been previously decreed to him.

The owners of the Beaver Creek Grass Mesa Ditch (District No. 45), and the Irrigators Association on Beaver Creek arrived at a stipulated agreement in a suit before the District Court. This ditch takes part of the natural drainage of Beaver Creek and its owners are now permitted to do so under their decree for part of the season between stated dates, and by keeping open the specified overflow-device between other dates.

The associated owners of the Home Supply Ditch (District No. 38) had their annual day in Court with practically the same result as before. The irrigators on the upper part of the ditch neglect to repair their leaking drainage crossings, and those on the lower end of the ditch are periodically short of water. The Court ordered the proper remedy and recommended metal flumes to be placed, etc., before the commencement of the next irrigation season.

The recommendations with respect to a change in the mode of appointment of Water Commissioners, contained in my report for 1913, are hereby repeated. A bill to the desired effect was introduced in the State Senate (Session of 1911) but later on withdrawn, mainly on account of energetic objections published by a former State Senator on the grounds that the City and County of Denver would have to bear one-third of the increased taxes resulting from the appropriation carried by the contemplated bill; whereas, as he claimed, Denver, was not affected by any water rights. The recent trials, hearings and investigations, affecting the Denver water supply have since disclosed the fact that in the Denver supply there are affected several dozen of water right decrees, and it would seem that your office, with this information in its possession, should recommend the passage of a bill which would make the office of Water Commissioner one of qualifications, better compensated, and which would, withal, offer

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IRRIGATION

RESERVOIR

Name of Reservoir	N.	Length of Dam	Height of Dam Above Bottom of Outlet—Feet	Dimensions of Outlet	Width of Spillway—Feet
DISTRICT 44					
J. N. Wyman	J. N. Wy	150	20	8″ x 10″	
Thornburgh	O. J. &	175	20	8″ x 12″	
Dry Lakes		250	12	8″ x 12″	
Dunstan	Tom Du	175	15	6″ x 10″	
Total					
DISTRICT 45					
Battlement Nos. 1-2-3-4-5-6-7	Battlem				
Total					
DISTRICT 58					
Gardner Park	Stillwate				
Wheeler	W. E. W				
Chambers	Chambe				
Allen	B. L. Al				
Hart Lake	Arnold				
Total					
DISTRICT 70					
McDowell	Briggs &				
Glen Beulah	J. W. C				
Blair & McDowell	Briggs &				
Myers	Albans				
Conwell	C. H. C				
Total					

to the right kind of candidates the proper inducement, and make the office of Water Commissioner more effective than it is now. The irrigation industry forming by far the most important asset of our State deserves the best treatment at the hands of the Legislature, and it should be urged by all legitimate means to create laws for the better development and progress of and protection to this industry.

Very respectfully,

(Signed) THEODORE ROSENBERG,
Division Engineer.

CHAPTER V

ABSTRACTS OF REPORTS OF WATER COMMISSIONERS

The following tables show the quantity of water used by various ditches and reservoirs during the seasons of 1913 and 1914. They are abstracted from the annual reports of the water commissioners and cover all reports of ditches to which twenty-five cubic feet per second or more of water has been decreed, and all reservoirs concerning which the necessary information is obtainable.

The first series of tables shows for each ditch the first and last day on which water was used, the number of days water was carried, the average daily quantity in cubic feet per second, the number of acre feet of water used, the number of acres irrigated, and the duty of water for each of the seasons 1913 and 1914. In some instances the figures given by the water commissioners' reports were obviously in error, and such have been omitted. In other cases a part of the information desired could not be obtained. However, the tables contain a sufficient volume of information, especially on the much disputed question of the duty of water to repay careful study. The tremendous variation in the duty is due partly to real difference in economy in the use and distribution of water, and in some few cases to inaccuracy of the figures furnished by the water commissioners. By far the greater part of this information, however, is believed to be substantially correct.

The second series of tables shows for each reservoir reported its capacity, the ditches supplied from it, and the volume of water in the reservoir on May 1st and November 1st of the years 1913 and 1914. This information is much less complete than in the case of the ditches, because, particularly in the case of the smaller reservoirs, accurate capacity surveys have not been made, and the reservoir owners content themselves with more or less accurate guesses. In these tables, as in those of the first series, figures which were obviously erroneous have been omitted. There is a possibility of error in some of those given, but it is not believed that these errors are large.

These tables follow the previous report, so that comparisons may be made with previous years.

DISTRICT NO. 1, DIVISION NO. 1—1913

NAME OF DITCH	Amount of Appropriation in Cu. Ft. Per Sec.	First Day Water Used	Last Day Water Used	Number of Days Water Carried from Natural Stream	Average Daily Amount of Water During Season	Number of Acre-Feet Used During Season	Number of Acres Irrigated	Duty in Acre-Feet Per Acre
Hoover	45.	May 20	Oct. 25	95	13	2550	....	....
Bijou	181.23	May 1	Nov. 15	199	141	56234	12010	4.78
Corona Ranch	56.	May 24	Nov. 1	90	14	2568	800	....
Shultz	28.	....	....	....	....	....	800	....
Putnam	40.	May 5	Nov. 1	178	12	4438	2500	1.78
Weldon Valley	165.	Apr. 20	Nov. 9	190	94	36020	6500	5.54
Ft. Morgan	323.	May 18	Nov. 15	107	139	29688	12000	2.47
Upper Platte and Beaver	234.17	May 1	Nov. 15	193	69	26970	11500	2.24
Deuel and Snyder	45.	May 1	Nov. 13	135	17	4664	2000	2.33
Brown and Piatt	45.	May 28	July 10	43	8	688	500	1.38
Lower Platte and Beaver	322.	May 17	Nov. 15	178	63	22746	14490	1.57
Cooper	90.	May 20	Oct. 25	147	6	1948	1600	1.22
Johnson and Edwards	63	May 12	Nov. 15	118	20	5120	2560	2.00
Tetsel	37.	May 28	Nov. 9	165	12	4194	1407	2.98
Beaver	44.	May 1	Nov. 1	180	5	1800	500	3.60
Beaver Farmer's C. & D. Co.	308.	July 19	Oct. 5	10	159	3180	4300	.74

DISTRICT NO. 2, DIVISION NO. 1

Brantner	111.18	May	5	Oct.	31	180	41	14760	4560	3.24
Platteville	147.38	May	1	Oct.	31	184	35	12880	2112	6.10
Farmer's and Gardener's	24	Jan.	1	*Nov.	1	365	6	4380	350	12.50
Lupton Bottom	140.57	May	1	Oct.	31	184	28	9800	1633	6.00
Brighton	44.8	May	10	Oct.	31	175	23	4048	2615	1.54
Fulton	448.8	Apr.	22	Nov.	7	199	75	29850	10795	2.78
Farmer's Independent	520.	May	1	Oct.	14	167	67	22378	7875	2.84
Meadow Island No. 1	26.23	May	23	Sept.	21	122	17	2074	1920	1.08
Meadow Island No. 2	66.16	May	30	Sept.	13	97	12	1164	862	1.35
Hews and Cook	98.57	May	12	Oct.	31	170	56	19040	7110	2.68
Hodgson	12.82	May	1	Sept.	30	153	4	1224	245	5.00
Lower Latham	287.73	May	1	Oct.	26	179	52	18616	8140	2.29
Section No. 3	57.71	May	29	Sept.	15	135	76	4320	1443	2.99
Highland	64.40	June	12	Aug.	27	74	7	2072	385	5.38
Union	184.03	May	1	Oct.	31	184	50	18400	4830	3.82
Evans No. 2	404.05	May	8	Oct.	10	110	101	11110	8397	1.32
Beeman	127.	May	26	Sept.	18	113	13	2938	1405	2.09
Buckers	121.87	May	9	Oct.	26	68	32	4352	6280	.69
Burlington	350.	May	1	*Nov.	1	213	42	17892	14940	1.20
Lupton Short Line	72.	Apr.	26	July	30	32	38	2432	410	5.94

*Still using.

DISTRICT NO. 3, DIVISION NO. 1

NAME OF DITCH	Amount of Appropriation in Cu. Ft. Per Sec.	First Day Water Used		Last Day Water Used		Number of Days Water Carried from Natural Stream	Average Daily Amount of Water During Season	Number of Acre-Feet Used During Season	Number of Acres Irrigated	Duty in Acre-Feet Per Acre
Dry Creek	50.92	Apr.	29	Sept.	27	152	19	3990	2300	1.74
Pleasant Valley	138.	Apr.	30	Sept.	27	147	45	13230	7000	1.89
Boyd and Freeman	99	May	26	Sept.	16	104	10	2080	700	2.80
Whitney	61.	May	22	Sept.	15	108	34.5	5452	2500	2.18
B. H. Eaton	41.	May	26	Sept.	15	113	10	2260	1100	2.05
Larimer and Weld	720.	May	7	Sept.	30	148	156	46176	53000	.87
J. G. Coy	31.	Apr.	28	Sept.	16	105	6	1260	290	4.35
Box Elder	52.7	Apr.	29	Sept.	9	104	20	4160	2000	2.40
Taylor and Gill	18.5	Apr.	28	Sept.	13	139	12	3336	600	5.70
Josh Ames	36.	May	15	Sept.	19	103	7	1442	710	2.03
Buckeye and Bristol	30.	....		....		....	....	....	2100	....
Cache la Poudre Irr. D. Co.	82.5	May	27	Sept.	14	86	20	3440	1600	2.15
Ft. Collins	130.	Apr.	28	Sept.	30	147	16	4707	3600	1.30
New Mercer	163.	May	13	Sept.	16	106	24	5088	6700	.76
Canal No. 3	173.	May	1	Sept.	30	153	43	13158	4000	3.29
Cache la Poudre Irr. Co.	585.	May	6	Sept.	17	89	254	45212	42000	1.08
Burnham and Emerson	26.	....		....		....	....	....	330	....
Lake	158.	May	14	July	28	54	83	8964	8000	1.12

DISTRICT NO. 3, DIVISION NO. 1—Concluded.

Larimer Co. No. 2	175.	May	12	Sept.	20	132	42	11088	7200	1.54
Larimer Co.	463.	May	18	Sept.	30	133	198		46000	
Ogilvy	57.6	May	15	Sept.	18	126			4000	
DISTRICT NO. 4, DIVISION NO. 1										
Handy	192.	May	10	Nov.	4	179	35	12520	13650	.92
Home Supply	279.	Apr.	9	Oct.	22	189	47	17766	22310	.80
South Side	50.	May	19	Sept.	23	126	10	2520	3375	.74
Louden	318.	May	23	Oct.	13	137	34	9316	15025	.62
Geo. Rist	195.	Apr.	1	Nov.	4	148	19	6424	5100	1.26
Barnes	44.	Apr.	17	Nov.	4	137	53	14522	1835	7.92
Rist and Goss	86.5	June	1	Aug.	10	71	4	568	445	1.28
Loveland and Greeley	402.23	Apr.	1	Nov.	4	158	69	21804	18825	1.16
Big Thompson No. 2	126	June	7	Sept.	15	80	21	3360	1965	1.71
Farmer's	64.	May	31	Sept.	20	113	12	2712	4110	.66
Hillsboro	153.6	May	12	Sept.	20	130	61	15860	11035	1.44
Hill and Brush	61.8	May	29	Sept.	20	83	11	1826	1500	1.22
Big Thompson and Platte R.	121.18	June	8	Oct.	4	119	24	5712	1860	3.07
Supply Lateral	74.57	May	29	July	12	44	10	880	935	.94
Boulder and Larimer Co.	66.72	May	29	June	4	3	23	138	1950	.07
Blower No. 1	44.93	May	29	July	12	45	4	360	320	1.12
Miner and Lougan	40.8	May	31	June	30	30	7	420	580	.72

DISTRICT NO. 5, DIVISION NO. 1

NAME OF DITCH	Amount of Appropriation in Cu. Ft. Per Sec.	First Day Water Used	Last Day Water Used	Number of Days Water Carried from Natural Stream	Average Daily Amount of Water During Season	Number of Acre-Feet Used During Season	Number of Acres Irrigated	Duty in Acre-Feet Per Acre
South Ledge	31.	May 11	Aug. 1	59	7.5	886	1110	.80
Supply	92.2	Mar. 9	Sept. 19	92	35.5	6532	14900	.44
Highland	229.	Mar. 3	Sept. 24	123	130	31980	27493	1.16
Rough and Ready	83.3	Apr. 25	Sept. 30	141	33	9306	20200	.46
Swede	24.6	May 28	Sept. 15	80	18	2880	2915	.99
St. Vrain and Palmerton	164.31	Mar. 21	Sept. 15	123	14	3444	1270	2.72
Longmont Supply	53.4	May 26	Sept. 17	115	14	3220	3270	.98
Oligarchy	239.31	May 23	Sept. 17	110	22	4840	3930	1.23
James	27.11	May 15	Sept. 12	121	7	1694	3250	.52
Pella	42.64	Apr. 28	Sept. 18	143	10	2860	890	3.21
Niwot	35.96	Apr. 28	Sept. 8	127	4	1016	725	1.40
South Flat	71.43	June 1	Sept. 24	146	7	2044	825	2.48
Chapman and McCaslin	98.13	June 1	Sept. 15	100	2.	400	495	.80
Denio and Taylor	41.8	May 12	Sept. 24	114	4.5	1026	810	1.27
Zweek and Turner	82.61	May 30	Sept. 17	110	7.	1540	685	2.25
Lefthand	726	June 1	Sept. 30	100	18.6	3720	14800	.25
Last Chance	96.94	June 1	Aug. 31	90	27.	2430	1153	2.10
Hayseed	41.54	June 1	July 31	61	3.	366	270	1.35

DISTRICT NO. 5, DIVISION NO. 1—Concluded.

Montgomery	31.96	June	1	July	31	50	1.5	150	80	1.88
Goss Private	29.51	June	1	July	31	61	1.	122	295	.42
Goss No. 2	25.01	June	1	July	31	61	1	122	395	.30
DISTRICT NO. 6, DIVISION NO. 1										
Lower Boulder	122.	Mar.	29	Sept.	16	106	36.6	9534	9860	.96
Smith and Goss	44.3	May	23	Sept.	10	100	2.5	502	220	2.28
Anderson	25	May	24	Sept.	29	121	7	850	850	1.00
Godding, Daily and Plum	30.44	June	2	Sept.	11	101	6.5	1326	530	2.50
No. Boulder Farmers	190	May	25	Sept.	16	93	25.2	4702	3530	1.34
Rural	221.04	June	2	Sept.	30	145	18.9	4350	3005	1.44
Green	34.68	May	26	Aug.	18	51	2.3	260	530	.49
Farmers	73.29	May	6	Sept.	15	108	28.	6072	8575	.71
Smith and Emmons	47.16	June	2	Sept.	11	81	5.2	848	678	1.25
Carr and Tyler	33.7	July	5	Sept.	11	66	2.1	286	160	1.78
Butte Mill	110.4	May	26	Sept.	9	46	5.3	488	1005	.48
Delehant	37.12	June	3	Sept.	8	50	3.1	316	484	.66
Highland So. Side	99.7	June	2	Sept.	11	49	30.7	3016	1325	2.27
Leggett	31.35	May	26	Sept.	15	44	30.2	2666	4565	.58
Boulder and Weld Co.	59.4	June	2	Sept.	8	28	20.1	1124	2595	.43
Boulder and White Rock	656.3	May	27	Sept.	20	23	41.3	7445	7515	.99
Boulder and Left Hand	246.6	May	24	Sept.	17	68	3.7	510	1000	.51
Silver Lake	45.	May	6	July	11	34	7.2	1135	1210	.94
Howard	36.	May	10	Oct.	4	153	6.3	1510	1205	1.26

DISTRICT NO. 6, DIVISION NO. 1—Concluded.

NAME OF DITCH	Amount of Appropriation in Cu. Ft. Per Sec.	First Day Water Used	Last Day Water Used	Number of Days Water Carried from Natural Stream	Average Daily Amount of Water During Season	Number of Acre-Feet Used During Season	Number of Acres Irrigated	Duty in Acre-Feet Per Acre
East Boulder	228.58	May 26	Sept. 24	114	5.6	1266	925	1.37
Cottonwood No. 2	33.7	May 15	Sept. 30	100	6.6	1336	725	1.81
Dry Creek (Davidson)	29.95	May 27	Sept. 19	109	6.5	1428	840	1.70
Dry Cr. No. 2	69.	May 1	Oct. 24	165	6.1	2058	1260	1.59
Enterprise	34.08	June 1	Sept. 3	64	9.4	1200	1340	.90
Leyner and Cottonwood No. 1	216.3	June 6	Oct. 9	104	14.6	3044	3545	.86
Marshallville	46.68	May 20	Oct. 10	43	13.4	1286	1680	.77
Davidson	221.35	May 14	Oct. 9	34	46	3120	4000	.78
Goodhue and Rock Cr.	96.23	May 2	Sept. 24	45	41.9	3778	3440	1.09
So. Boulder and Coal Cr.	65.93	May 16	Sept. 12	29	28.5	1654	1965	.84
Community	83.3	May 3	May 19	17	57.7	8780	10960	.80
DISTRICT NO. 7, DIVISION NO. 1								
Golden Canal	720.66	Apr. 17	Oct. 20	187	112.15	41950	42200	1.00
Swadley	25.	....	....	....	....	....	450	....
Fisher	35.	May 15	Oct. 7	134	11.2	3000	2350	1.28
Clear Cr. and Platte R.	70.06	May 10	Oct. 7	151	19.9	5990	2625	2.28
Rocky Mountain	190.00	Apr. 28	Sept. 24	131	51.8	15854	7850	2.02
Lee, Stewart and Eskins	33.19	May 7	Sept. 29	142	10.25	2872	2310	1.24
Golden City and Ralston Cr.	110.9	May 1	Nov. 15	186	55.15	20526	13200	1.55

DISTRICT No. 7, DIVISION No. 1—Concluded.

Colorado Agricultural	61.8	May 10	Oct. 7	146	20.26	5910	2350	2.52
Golden	26.	Apr. 22	Oct. 3	123	22.3	5288	4650	1.14
Agricultural	150.	Mar. 19	Oct. 10	128	49.22	12710	11300	1.12
DISTRICT NO. 8, DIVISION NO. 1								
Platte Water Co.	85.95	Apr. 25	Oct. 28	179	32	11456	1500	7.65
Nevada	62.3	May 6	Nov. 4	183	55	20130	1640	12.20
Platte Canon	56.	May 13	Oct. 31	171	16.5	5643	924	6.10
Last Chance	32.	May 17	Oct. 20	155	28.	8680	1100	7.88
Northern Colo. Irr. Co.	1184.	Apr. 24	Oct. 28	116	193	44742	28000	1.60
First Attempt	32.	....	....	....	....	....	18	....
Arapahoe	50.	None	None	....	....	....	10000	....
DISTRICT NO. 9, DIVISION NO. 1								
Simonton	35.76	May 24	Oct. 14	112	8.6	1926	426	4.53
Warrior	52.52	May 25	Oct. 3	132	25.9	6637	1457	4.55
Pioneer Union	55.67	May 25	Oct. 18	138	12.5	3450	707	4.88
Arnett	56.65	Mar. 12	Oct. 28	184	26.5	10017	2821	3.56
Lewis and Strouse	30.68	May 12	Sept. 6	75	1.7	255	30	.85
DISTRICT NO. 11, DIVISION NO. 2								
Missouri Park	40.	May 10	Oct. 1	120	35.	8400	1436	5.84
Riverside	26.	May 20	Sept. 1	90	7.5	1350	167	8.09
Bowen	50.9	....	....	....	....	....	446	....
Sunnyside Park	29.17	May 10	Oct. 1	120	4.17	1000	318	3.20
Starr	52.15	June 1	Oct. 1	120	30	7200	....	....
Stevens and Leiter	36.	Jan. 1, '12	Jan. 1, '13	365	36	26380	....	....

DISTRICT NO. 12, DIVISION NO. 2

NAME OF DITCH	Amount of Appropriation in Cu. Ft. Per Sec.	First Day Water Used	Last Day Water Used	Number of Days Water Carried from Natural Stream	Average Daily Amount of Water During Season	Number of Acre-Feet Used During Season	Number of Acres Irrigated	Duty in Acre-Feet Per Acre
Park Center	28.92	Apr. 16	Oct. 15	175	15.6	5460	1272	4.28
Beaver Water & Irr. Co.	58.	Nov. 1, '12	Oct. 31	362	16.33	11823	4850	2.44
Union	48.	Nov. 6, '12	Oct. 31	361	24	17328	845	
So. Canon	40.	Nov. 6, '12	Oct. 31	239	26	12428	1400	
Canon City and Oil Creek	33.6	Nov. 1, '12	Oct. 31	257	27	14028	1145	
Canon City Hyd. & Irr. Co.	96.	Nov. 1, '12	Cct. 31	281	54	30348	2750	
DeWeese Dye	28.5	Nov. 15,'12	Oct. 31	168	11.3	3797	1150	3.30
Fremont Water Supply Co.	57.	Mar. 2	Oct. 31	184	2.85	104C	160	6.50
Arkansas Valley Conduit	70.	Nov. 1, '12	Oct. 31	365	69.	36570		
DISTRICT NO. 14, DIVISION NO. 2								
Arkansas Valley	70.							
Oxford Farmers	116.	Mar. 4	Sept. 27	184	40.67	14964	5815	2.57
Bessemer	370.	Jan. 16	Nov. 1	319	73.97	47296	19385	2.44
Collier	26.							
Excelsior	60.	June 2	Aug. 23	24	41.15	1975	3130	.63
Pueblo Water Works	46.							
Rocky Ford Highline	469.1	Nov. 1, '12	Oct. 31	345	81.15	56000	28000	2.00
Colorado Canal	756.28	Jan. 1	Oct. 13	126	154.	38803	45000	.86

DISTRICT NO. 16, DIVISION NO. 2.								
Montes	37.64	Apr. 20	Oct. 3	30	8.6	516	175	2.95
Huerfano Valley	42.	Mar. 12		35	30	2100	2630	.80
DISTRICT NO. 17, DIVISION NO. 2								
Rocky Ford	209.	Nov. 1, '12	Oct. 31	345	70	47650	9165	5.20
Jones Consolidated	129.5	Nov. 6, '12	Oct. 31	305	42.5	17140	6200	2.76
Las Animas Town	32.5	Nov. 1, '12	Oct. 31	230	25.6	11742	2460	4.78
Ft. Lyon	933.	Nov. 1, '12	Oct. 31	356	214.6	152768	71200	2.14
Catlin	345.	Nov. 1, '12	Oct. 31	263	136.	71494	19881	3.59
Lake and (Holbrook)	600.	Nov. 1912	Aug. 24	9	155	2790	19800	
Otero	457.92	Nov. 1912	Aug. 24	8	160	2560	16360	
Timpas Creek	51.84	June 13	Aug. 13	6	45	540	3225	
Omer	120.4	June 13	Aug. 24	8	30	480	8100	
DISTRICT NO. 19, DIVISION NO. 2								
Baca (No. side)	54.44	May 3					4308	
DISTRICT NO. 21, DIVISION NO. 3								
Capulin	31.37	Apr. 20	Aug. 1	90	30		750	
Head Overflow	49.	Apr. 10	July 1	70	4		2000	
Alamosa Spring Creek	62.	May 1	Aug. 1	60	29		2000	
Aroya	53.	May 1	Aug. 1	70	50		1300	
Union	40.	May 1	July 1	80	35		3500	
No. Alamosa	49.	May 1	July 1	60	40		1280	
Cottonwood	35.8	May 10	July 20	60	30		1000	

DISTRICT NO. 21, DIVISION NO. 3—Concluded.

NAME OF DITCH	Amount of Appropriation in Cu. Ft. Per Sec.	First Day Water Used		Last Day Water Used		Number of Days Water Carried from Natural Stream	Average Daily Amount of Water During Season	Number of Acre-Feet Used During Season	Number of Acres Irrigated	Duty in Acre-Feet Per Acre
Overflow No. 4	40.	May	1	Aug.	1	50	5	....	500	....
Lower La Jara	44.8	May	1	July	30	40	44	....	1700	....
Norland	48.	Apr.	25	July	20	50	45	....	705	....
Flinthan	25.	May	1	Aug.	1	45	20	....	600	....
Miller	66.	May	1	July	25	40	40	....	1210	....
Overflow No. 1	112.	Apr.	20	July	1	60	112	....	5030	....
Plano Vista	30.	May	1	Aug.	1	60	20	....	1720	....
Davies-Chapman	51.	May	1	July	1	65	25	....	1200	....
Scandinavian	43.	May	1	July	1	60	10	....	1000	....
Alamosa Creek	50.	May	1	Aug.	1	60	40	....	4220	....
Coddington	30.	June	1	Aug.	1	70	30	....	960	....
Rivera	28.	Apr.	1	July	1	45	15	....	360	....
La Joya	27.	Apr.	1	June	25	45	20	....	585	....
DISTRICT NO. 22, DIVISION NO. 3										
Santiago	55.59	Apr.	16	July	1	75	....	....	1000	....
San Juan and San Rafael	47.76	Apr.	16	June	25	70	....	....	160	....
Sanchez	27.26	Apr.	16	July	11	88	....	....	900	....
Sanford	107.5	Apr.	16	June	5	50	....	....	4000	....

DISTRICT NO. 22, DIVISION NO. 3—Continued.

Trujillo	29.8	Apr. 16	July 4	79	......	......	400	......
Taos Valley No. 1	500.	Apr. 16	June 12	57	......	......	......	......
Taos Valley No. 2	500.	Apr. 16	June 12	57	......	......	......	......
Espinosa J. N.	26.	Apr. 16	July 4	79	......	......	60	......
Angustura	42.72	Apr. 16	June 22	67	......	......	320	......
Alamo	36.	Apr. 16	June 20	61	......	......	2080	......
Antonito	250.	Apr. 16	June 20	61	......	......	1440	......
Canon	42.89	Apr. 16	July 18	93	......	......	1700	......
Cottonwood	28.5	Apr. 16	June 13	58	......	......	1120	......
El Cado	25.18	Apr. 16	Aug. 25	131	......	......	900	......
Ephraim	47.	Apr. 16	July 3	78	......	......	4000	......
Fuerticitos	31.47	Apr. 16	July 5	80	......	......	400	......
Guadalupe	69.82	Apr. 16	Oct. 4	173	......	......	2560	......
Heads Mill	117.44	Apr. 16	July 26	101	......	......	80	......
Llano	31.18	Apr. 16	Aug. 15	121	......	......	900	......
Del Rio	31.44	Apr. 16	July 5	50	......	......	640	......
Los Sauces	27.58	Apr. 16	July 8	83	......	......	600	......
Lobato	88.43	Apr. 16	July 10	85	......	......	80	......
Los Ojos No. 1	44.2	Apr. 16	June 27	72	......	......	1400	......
Mesitas	38.99	Apr. 16	July 15	90	......	......	2200	......
Manassa	73.6	Apr. 16	July 1	75	......	......	2000	......
Mogote	342.4	Apr. 16	June 10	55	......	......	......	......

DISTRICT NO. 22, DIVISION NO. 3—Concluded.

NAME OF DITCH	Amount of Appropriation in Cu. Ft. Per Sec.	First Day Water Used	Last Day Water Used	Number of Days Water Carried from Natural Stream	Average Daily Amount of Water During Season	Number of Acre-Feet Used During Season	Number of Acres Irrigated	Duty in Acre-Feet Per Acre
Northeastern	122.8	Apr. 16	June 22	67	....	....	....	....
Richfield	56.24	Apr. 16	June 12	57	....	....	3000	....
Romero	46.97	Apr. 16	July 5	80	....	....	6370	....
Servietta	31.70	Apr. 16	July 26	101	....	....	2410	....
Seledonia Valdes	31.77	Apr. 16	July 26	101	....	....	600	....
San Jose	40.28	Apr. 16	July 24	99	....	....	1600	....
DISTRICT NO. 25, DIVISION NO. 3								
Baca Grant	150.	Apr. 9	Aug. 24	137	33	9042	4435	2.04
Wale & Shellanbarger	75.	Apr. 16	Aug. 27	120	11.5	2760	1942	1.42
DISTRICT NO. 26, DIVISION NO. 3								
Travis	25.	Apr. 24	July 3	35	21.4	....	1250	....
Company	92.73	Apr. 5	June 30	86	27.83	....	4050	....
DISTRICT NO. 30, DIVISION NO. 3								
Florida Farmers	45.	July 3	Sept. 5	65	24.	3120	2935	....
Florida Mesa	200.	July 13	Sept. 5	60	19.	2280	3050	.74
DISTRICT NO. 33, DIVISION NO. 4								
Park	41.5	May 20	Sept. 30	190.	12.	2820	....	....

DISTRICT NO. 38, DIVISION NO. 5										
East Mesa	31.8	......		......		......	20.	......	495	......
Glenwood	30.	......		......		......	15.	......	604	......
Salvation	58.	......		......		......	25.	......	899	......
Mountain Meadow	25.6	......		......		......	2.5	......	150	......
DISTRICT NO. 39, DIVISION NO. 5										
Irrigation Co. (Farmers)	100.	May	2	Aug.	28	107	7.3	1.562	3184	.49
Willcox Canal	300.	......		......		......	......	......	534	......
DISTRICT NO. 40, DIVISION NO. 4										
Alfalfa	30.	June	3	Sept.	25	......	......	......	1612	......
Butte	45.	June	3	Sept.	24	114	19.82	......	2357	......
Fogg	35	June	3	July	4	32	4.02	......	......	......
DISTRICT NO. 42, DIVISION NO. 4										
City of Grand Junction	300.	June	17	Oct.	12	117	5.39	631	......	......
DISTRICT NO. 44, DIVISION NO. 5										
Lilly Park No. 1	36.67	May	1	Aug.	1	100	25.	......	902	......
Cross Mountain	42.	May	1	Aug.	1	80	25	......	805	......
DISTRICT NO. 46, DIVISION NO. 1										
Eureka	70.	May	20	July	10	50	35	3500	2395	1.46
Mallon	37.5	May	10	July	14	64	35	4480	1200	3.74
Wolfer	146.	May	15	July	20	65	130	16900	11900	1.42
Mitchell	31.75	Apr.	25	July	10	75	18	2710	700	3.87
Mutual	100.	May	10	July	10	60	65	7800	4300	1.81

DISTRICT NO. 46, DIVISION No. 1—Concluded.

NAME OF DITCH	Amount of Appropriation in Cu. Ft. Per Sec.	First Day Water Used	Last Day Water Used	Number of Days Water Carried from Natural Stream	Average Daily Amount of Water During Season	Number of Acre-Feet Used During Season	Number of Acres Irrigated	Duty in Acre-Feet Per Acre
Victor	35	May 1	July 15	75	16	2400	890	2.70
Roaring	38.25	May 5	July 10	65	24	3120	1000	3.12
Pleasant Vailey	36.	May 10	July 10	60	40	4800	2500	1.92
Davis	35	May 1	July 10	70	30	4200	1500	2.80
Staples No. 2	104.4	May 12	July 10	58	36	4176	3220	1.29
Little Grizzley	25.	Apr. 25	June 25	60	20	2400	550	4.36
Damfino	25.	May 25	July 10	45	12	1180	1400	.84
Arapahoe	39	May 12	July 10	58	19	2206	1220	1.80
Big Grizzley	30	May 5	July 10	65	18	2340	1280	1.83
Little Nellie	87.5	May 1	July 5	65	70	9100	4000	2.28
Chapman	27.	May 10	July 10	60	25	3000	8000	3.75
Mallon No. 2	80.	May 10	July 14	64	65	8320	3200	2.60
Darby	69.5	May 5	July 1	55	58	6380	3200	1.99
Hanson	93.24	May 1	July 10	70	80	11200	7000	1.60
Independent	33.75	May 10	July 15	65	30.	3900	1660	2.36
Briggs-Bohn	36.	May 10	July 20	70	25.	3500	1200	2.92

DISTRICT NO. 48, DIVISION NO. 1								
Laramie River	400.	May 19						
Lone Tree	25.	May 5	June 28	53	2.45	259.7	30	8.68
Sand Creek System	288.	May 15	June 2	18				
DISTRICT NO. 54, DIVISION NO. 5								
Fourmile	25	June 5	July 5	30	4.	240	120	2.00
Willow Cr.	77.05	May 2	Aug. 20	50	5.23	1150.6	710	1.62
DISTRICT NO. 60, DIVISION NO. 4.								
Gurley	62.5	May 16	Aug. 15	91	28.	5096	4311	1.18
Colony	60.	Apr. 15	Nov. 1	200	40.	16000	2810	5.70
DISTRICT NO. 62, DIVISION NO. 4.								
Cimarron	60						5000	
DISTRICT NO. 64, DIVISION NO. 1								
South Platte	87.5	May 7	Oct. 19	140	24.4	6832	4000	1.71
Schneider	58.	May 6	Oct. 18	131	27.3	6606	2420	2.73
Sterling Irrigation	113.	June 1	Sept. 12	112	66.3	14850	5122	2.90
Pawnee	140.4	May 6	Oct. 12	158	70.5	22278	15500	1.44
Davis Bros.	127.	May 6	Oct. 29	64	18.	2304	2460	.94
Low Line	39.9	May 30	Oct. 19	123	23.5	5782	2980	1.94
Illiff and Platte Valley	150.	May 7	Oct. 15	143	28.	8048	8800	.91
Sterling No. 2	50.	June 24	Oct. 5	41	11.5	942	2203	.42
Springdale	62.5	May 7	Oct. 21	85	29.	4930	4480	1.10
South Reservation	25.	May 15	Oct. 15	50	13.	1300	1300	1.00

DISTRICT NO. 64, DIVISION NO. 1—Concluded

NAME OF DITCH	Amount of Appropriation in Cu. Ft. Per Sec.	First Day Water Used	Last Day Water Used	Number of Days Water Carried from Natural Stream	Average Daily Amount of Water During Season	Number of Acre-Feet Used During Season	Number of Acres Irrigated	Duty in Acre-Feet Per Acre
Bravo	40.	May 6	Nov. 1	78	21.	3276	1790	1.83
Powell and Dillon	45.	May 16	Aug. 9	36	23.	1656	1800	.92
Knowles Spring No. 1	60.	Apr. 1	Sept. 20	20	3.	120	240	.50
Powell	40.	Apr. 22	Oct. 10	103	19.4	3996	2060	1.94
Harmony No. 1	252	Apr. 8	Sept. 8	30	33.8	2028	1415	1.48
Chambers	30	Apr. 6	Oct. 15	25	11.2	560	425	1.32
Harmony No. 2	212	Aug. 30	Sept. 4	9	27.6	496	735	.68
Peterson	534	Apr. 1	Oct. 31	203	33.4	13560	8500	1.59
Red Lion Supply	52	Apr. 1	Sept. 30	59	13.5	1593	1100	1.44
Settlers	288	Apr. 1	Oct. 30	71	22.2	3154	5100	.62
Tamarack	134	...	...	...	...	...	...	...
Harmony No. 3	219	Apr. 1	Sept. 8	15	18.	540	590	.92
Cox Irrig. Co.	42.5	May 15	Oct. 15	152	20.	6080	600	10.12
Jumbo Highline	450.	Apr. 1	Oct. 31	52	83.	8632	7400	1.16
DISTRICT NO. 65, DIVISION NO. 1								
Wray Millrace	50.	...	...	...	...	...	...	...

DISTRICT NO. 67, DIVISION NO. 2

Fort Bent	86.81	Nov. 16,'12	Nov. 15,'13	230	30.	13800	3830	3.62
Amity	283.5	Nov. 16,'12	Nov. 15,'13	154	177.	54516	29327	1.86
Lamar	285.75	Nov. 16,'12	Nov. 15,'13	267	50.	26700	7465	3.58
Manvel	54.	June 4	Nov. 15	74	13.	1940	260	7.46
X Y	69.	Apr. 14	Nov. 15	165	17.	5600	1650	3.40
Graham	61.	Nov. 16,'12	July 31	56	18.	2044	1877	1.09
Buffalo	67.5	Nov. 16,'12	Oct. 9	190	14.	5320	950	5.60

DIVISION NO. 1, DISTRICT NO. 1—1913

Name of Reservoir	Source of Supply	Capacity in Cubic Feet	Ditch Supplied from Reservoir	Quantity of Water in Reservoir, Cubic Feet	
				May 1st	Nov. 1st
Jackson Lake	So. Platte	1,543,991,407	Fort Morgan Canal, Upper Platte and Beaver, Lower Platte and Beaver and other small ditches	1,350,000,000	0
Empire	So. Platte	1,642,629,890	Bijou Irrig. Dist.	1,060,000,000	0
Moore Res. No. 4	Deer Trail or Muddy	46,000,000	Moore	10,000,000	0
Riverside	So. Platte	2,860,000,000	Riverside Res. & Land Co., Fort Morgan Canal, Upper Platte and Beaver, Lower Platte and Beaver and other small ditches	2,196,912,896	0
Fort Morgan Land and Res. Co. No. 2	So. Platte	435,600,000	Bijou Irrig. Dist.		0
Point of Rocks	So. Platte	3,920,400,000	North Sterling Irrig. Dist.		
Prewitt	So. Platte				
DIVISION NO. 1, DISTRICT NO. 2					
Oasis	So. Platte	1,436,880,000	Hudson Lateral, Burlington Lateral	1,436,880,000	3,000
Horse Creek	So. Platte	740,520,000	Henrylyn Canals and Laterals	740,520,000	0
Prospect	So. Platte	243,936,000	Laterals	243,936,000	0
Sand Creek	So. Platte	78,408,000	Laterals	78,408,000	0
Higgins	So. Platte	4,900,500	Laterals	4,900,500	0
Lutz	So. Platte	2,380,200	Laterals	2,380,200	0

DIVISION NO. 1, DISTRICT NO. 2—Concluded.

Magers	So. Platte	2,321,021	Laterals	2,321,021	0
Little Western	So. Platte	5,500,000	Laterals	5,500,000	0
H. A. Smith	So. Platte	4,530,240	Laterals	4,530,240	0
Skeel No. 1	So. Platte	6,975,000	Laterals	6,975,000	0
Rutherford	So. Platte	1,787,500	Laterals	1,787,500	0
George Smith	So. Platte	3,180,255	Laterals	3,180,255	0
Fulton Waste	So. Platte	22,895,225	Laterals	22,895,225	0
Lower Latham	So. Platte	270,700,000	Latham	270,700,000	0
Z. J. Fort	So. Platte	7,168,200	Laterals	7,168,200	0
Milton	So. Platte	1,873,080,000	Gilmore	926,540,000	435,600,000
Carlin	So. Platte	9,500,000	Laterals	0	0
Duggan	So. Platte	9,626,760	Laterals	0	0
Standley Lake	Clear, Leyden, Woman, Ralston and Coal Creeks	1,960,200,000	Bull, Niver and O'Brian	1,176,120,000	392,040,000
DIVISION NO. 1. DISTRICT NO. 3					
Warren Lake	Cache la Poudre	96,000,000	Warren L. Outlet	96,000,000	4,000,000
Windsor Lake	Cache la Poudre	78,408,000	Windsor L. Outlet	41,000,000	35,000,000
North Gray	Box Elder	12,000,000	Lake Canal	12,000,000	9,000,000
South Gray	Box Elder	22,293,000	Lake Canal	22,000,000	16,000,000
Res. No. 2 and 3, W. S. & S. Co.	Cache la Poudre	30,000,000	Larimer Co. (By Exch.)	0	0
Res. No. 4, W. S. & S. Co.	Cache la Poudre	43,370,000	Larimer Co. (By Exch.)	43,000,000	25,000,000
Spring Canon	Spring Canon Cr.	2,683,000	Outlet	2,000,000	0

DIVISION NO. 1, DISTRICT NO. 3—Continued

Name of Reservoir	Source of Supply	Capacity in Cubic Feet	Ditch Supplied from Reservoir	Quantity of Water in Reservoir, Cubic Feet	
				May 1st	Nov. 1st
Res. No. 1, N. Poudre Irr. Co.	North Poudre	29,346,000	Outlet	29,000,000	12,000,000
Claymore Lake	Cache la Poudre	39,000,000	P. V. and Lake Canal	35,000,000	25,000,000
Res. No. 1, Box Elder D. & R. Co.	Box Elder	24,830,000	Outlet	20,000,000	10,000,000
Richards	Cache la Poudre	46,000,000	Larimer Co. (By Exch.)	40,000,000	0
Res. No. 3, Box Elder D. & R. Co.	Box Elder	8,500,000	Outlet	5,000,000	2,000,000
Res. No. 3, N. Poudre Irr. Co.	North Poudre	125,000,000	Outlet	125,000,000	0
Caverly	North Poudre	7,500,000	Outlet	7,000,000	0
Curtis Lake	Cache la Poudre	34,000,000	Larimer Co. (By Exch.)	34,000,000	0
Dixon Canon	Dixon Canon Cr.	19,500,000	Outlet	10,000,000	2,000,000
Res. No. 4, Box Elder D. & R. Co.	Box Elder	11,000,000	Outlet	5,000,000	3,000,000
Res. No. 3, Box Elder D. & R. Co.	Box Elder	34,500,000	Outlet	25,000,000	10,000,000
Stuchell	North Poudre	3,050,000	Outlet	3,000,000	0
Jameson Lake	Box Elder	3,500,000	Outlet	2,000,000	0
Mitchell Lake No. 1	Lone Pine	25,280,000	Larimer and Weld	25,200,000	5,000,000
Mitchell Lake No. 2	Lone Pine	4,370,000	Larimer and Weld	4,000,000	0
Mitchell Lake No. 3	Lone Pine	4,335,000	Larimer and Weld	4,000,000	0
Res. No. 4, N. Poudre Irr. Co.	North Poudre	46,766,000	Outlet	47,000,000	20,000,000
Res. No. 2, N. Poudre Irr. Co.	North Poudre	169,000,000	Outlet	169,000,000	0
Larimer and Weld	Cache la Poudre	390,000,000	Larimer and Weld	380,000,000	190,000,000

DIVISION NO. 1, DISTRICT NO. 3—Continued

Windsor	Cache la Poudre	810,000,000	Cache la Poudre	770,000,000	403,000,000
Res. No. 1, W. S. & S. Co.	Cache la Poudre	206,000,000	Larimer Co. (By Exch.)	200,000,000	105,000,000
Long Pond	Cache la Poudre	176,000,000	Larimer Co. (By Exch.)	176,000,000	0
Lindenmeier's	Cache la Poudre	40,000,000	Larimer Co.	25,000,000	10,000,000
Cache la Poudre	Cache la Poudre	415,000,000	Cache la Poudre	410,000,000	180,000,000
Wood	Seepage and Flood	140,000,000	Outlet	70,000,000	0
Res. No. 5, N. Poudre Irr. Co.	Cache la Poudre	250,000,000	N. Poudre (By Exch.)	190,000,000	150,000,000
Neece	Floodwater	4,257,000	Neece Ditch	3,000,000	0
Res. No. 1, Lake Canal & R. Co.	Cooper & Ames Slough	35,000,000	Lake Canal	31,000,000	0
Dowdy & Twin	Lone Pine	16,856,000	Laramie-Poudre	20,000,000	8,000,000
Res. No. 6, N. Poudre Irr. Co.	Cache la Poudre	445,000,000	N. Poudre (By Exch.)	380,000,000	290,000,000
Deer Lake	Lone Pine	3,842,000	Laramie-Poudre	1,000,000	0
Fossil Creek	Cache la Poudre	503,000,000	N. Poudre (By Exch.)	503,000,000	137,000,000
Erie Lake	Lone Pine	3,000,000	Laramie-Poudre	0	0
Douglas	Cache la Poudre	460,000,000	Larimer and Weld	287,000,000	17,000,000
Coal Creek	Box Elder	178,400,000	Cactus Hill	150,000,000	120,000,000
Res. No. 3, Agri. College	Soldier Canon	31,000,000	Outlet	20,000,000	5,000,000
Big Beaver	Beaver Creek	69,201,000	Water for sale	24,000,000	0
Res. No. 8, Windsor Res. Co.	Cache la Poudre	400,000,000	Larimer and Weld	300,000,000	110,000,000
Cameron Pass	Joe Wright Cr.	35,458,000	Poudre Valley	0	0
Black Hollow	Cache la Poudre	250,000,000	Larimer County	250,000,000	0
Tenny	Cache la Poudre	15,000,000	Mt. Supply	10,000,000	0
Res. No. 2, Mt. Supply Co.	Cache la Poudre	6,500,000	Mt. Supply	6,000,000	0

DIVISION NO. 1, DISTRICT NO. 3—Concluded

Name of Reservoir	Source of Supply	Capacity in Cubic Feet	Ditch Supplied from Reservoir	Quantity of Water in Reservoir, Cubic Feet May 1st	Quantity of Water in Reservoir, Cubic Feet Nov. 1st
Bubble	Cache la Poudre	9,750,000	Mt. Supply	7,000,000	0
Halligan	N. Poudre	280,000,000	N. Poudre	265,000,000	31,000,000
Res. No. 15, N. Poudre Irr. Co.	N. Poudre	240,000,000	N. Poudre	80,000,000	40,000,000
Sheep Creek	Sheep Creek	20,000,000	Water for sale	7,000,000	0
Lake Agnes	Zimmerman Cr.	5,000,000	Water for sale	5,000,000	0
Timberline	Beaver Cr.	33,000,000	Water for sale	0	0
Elder	Cache la Poudre	100,000,000	Larimer and Weld	0	0
Portner	Fossil and Cache la Poudre	26,000,000	N. Poudre (By Exch.)	10,000,000	0
Chambers Lake	Cache la Poudre	290,000,000	Larimer County	80,000,000	0
DIVISION NO. 1, DISTRICT NO. 4					
Boyd Lake	Big Thompson	1,918,000,000	Exchange	1,000,000,000	896,320,000
Donath	Big Thompson	50,000,000	Loveland and Greeley	25,000,000	25,000,000
Mariano	Big Thompson	180,000,000	Home Supply	180,000,000	120,000,000
Home Supply	Big Thompson	400,000,000	Home Supply	375,000,000	300,000,000
Lake Loveland	Big Thompson	625,000,000	Loveland and Greeley	571,096,806	136,813,516
Seven Lakes	Big Thompson	367,300,000	Loveland and Greeley	250,000,000	125,000,000
Buckhorn	Buckhorn Cr.	50,000,000	Louden	48,000,000	48,000,000
Long Lake	Roaring Fork	33,088,000	Farmers	33,088,000	0

DIVISION NO. 1, DISTRICT NO. 4—Concluded.

Boulder and Larimer	Little Thompson	319,895,000	Boulder and Larimer County	319,895,000	65,637,000
Welch Lakes Nos. 3 and 4	Big Thompson	20,564,676	Handy	20,564,676	15,000,000
Welch Lakes Nos. 1, 2 and 5	Big Thompson	168,598,658	Handy	140,000,000	35,000,000
Ryan Gulch	Ryan Gulch Seepage	31,796,870	Rist	31,796,870	1,796,870
South Side	Ryan Gulch	15,285,639	South Side	15,285,639	285,639
DIVISION NO. 1, DISTRICT NO. 5					
Pleasant Valley	St. Vrain	110,300,055	Rough & Ready	100,000,000	70,000,000
Knoths Lake	St. Vrain	2,000,000	Hansen	1,000,000	0
Highland No. 1	St. Vrain	125,071,248	Highland	35,000,000	50,000.000
Highland No. 2	St. Vrain	105,280,000	Highland	50,000,000	69,600,000
Highland No. 3	St. Vrain	71,023,000	Highland	40,000,000	60,000,000
Highland Lake	St. Vrain	24,452,500	Private Ditches	5,000,000	0
McIntosh Lake	St. Vrain	107,153,830	Oligarchy	35,000,000	0
Union	St. Vrain	850,000,000	Union (in Dist. No. 2)	850,000,000	500,000,000
Oligarchy	St. Vrain	76,816,437	Oligarchy	50,000,000	50,000,000
Gold	So. St. Vrain	19,000,000	Left Hand	5,000,000	5,000,000
Crystal Lake	St. Vrain and Left Hand	1,033,000	Private Ditches	1,000,000	500,000
Clover Lake	Dry Cr., Lykins Gulch and St. Vrain	25,962,250	Clover Basin	20,000,000	5,000,000
Beaver Park	Beaver Cr.	122,976,000	Highland and Supply	20,000,000	5,000
Foot Hills	St. Vrain	184,629,820	Oligarchy and 7 others	30,000,000	27,000,000

DIVISION NO. 1, DISTRICT NO. 6

Name of Reservoir	Source of Supply	Capacity in Cubic Feet	Ditch Supplied from Reservoir	Quantity of Water in Reservoir, Cubic Feet	
				May 1st	Nov. 1st
Marshall Lake	So. Boulder	381,000,000	Community	55,800,000	0
West Lake	So. Boulder and Coal	30,450,000	Community	20,450,000	450,000
Section 19	So. Boulder and Coal	3,520,000	Community	2,520,000	520,000
Section 17	So. Boulder and Coal	1,475,812	Community	1,000,000	475,000
Section 15	So. Boulder and Coal	769,900	Community	700,000	7,900
Section 35	So. Boulder and Coal	2,500,100	Community	2,000,000	500,000
Section 11	So. Boulder and Coal	3,598,056	Community	598,000	200,000
McKay Lake	So. Boulder and Coal	41,678,208	Community	20,500,600	500,000
Section 9	Coal Cr.	927,000	Community	500,000	7,000
Erie	So. Boulder	5,206,750	Erie	5,400,000	500,000
Louisville	So. Boulder	12,664,864	Louisville	6,500,400	5,000,000
Harper	So. Boulder	2,713,450	Harper	500,000	500
Prince	So. Boulder	3,520,250	Prince	1,635,500	500,000
Silver Lake	N. Boulder	35,164,124	Silver Lake	15,500,000	500,000
Island Lake	N. Boulder	16,196,629	City of Boulder	8,500,000	8,000,000
Goose Lake	N. Boulder	20,024,899	City of Boulder	6,500,400	500,000
Panama No. 3	Boulder	196,000,000	White Rock	190,000,000	50,000
Panama No. 1	Boulder	304,920,000	Panama	205,500,000	5,500,000
Base Line	So. Boulder	130,680,000	Lower Boulder	125,500,000	5,200,000

DIVISION NO. 1, DISTRICT NO. 6—Concluded

Barker Meadow	Middle Boulder	479,160,000	Power Line	174,240,000	152,000,000
Smart	Coal Cr.	10,305,000	Community	3,500,000	100,000
Kinnear	Coal Cr.	40,982,478	Community	35,000,000	500,000
Last Chance	Coal Cr.	1,983,200	Zang	1,500,000	100,000
Churches Upper Lake	Coal Cr.	1,960,000	Community	1,910,000	50,000
Eggleston No. 4	Coal Cr.	1,015,000	Eggleston	1,500,000	50,000
Eggleston No. 6	Coal Cr.	8,000,000	Eggleston	7,000,000	650,000
Lafayette No. 1	So. Boulder	614,685	City of Lafayette	0	650,000
Lafayette No. 2	So. Boulder	892,000	City of Lafayette	800,000	805,600
Teller No. 5	So. Boulder	4,625,529	Lake Lateral	2,600,000	1,500,000
Jim Burke	So. Boulder	1,500,850	J. Burke Lateral	1,000,000	900,000
DIVISION NO. 1, DISTRICT NO. 7					
Neresheimer	Clear Cr.	13,068,000	Farmers Highline	11,000,000	7,000,000
Brown	Clear Cr.	8,276,400	Farmers Highline	7,000,000	4,000,000
Bromley	Clear Cr.	8,712,000	Farmers Highline	8,000,000	5,000,000
Smith	Clear Cr.	7,840,800	Farmers Highline	7,000,000	5,000,000
Richardson	Clear Cr.	13,068,000	Farmers Highline	11,000,000	7,000,000
Porters	Clear Cr.	13,503,600	Farmers Highline	11,000,000	8,000,000
Bancrofts 1-2-3-4	Clear Cr.	11,351,000	Agricultural	11,000,000	9,000,000
Lee 1 and 2	Clear Cr.	5,103,800	Agricultural	5,000,000	3,000,000
Hallack 1-2-3	Clear Cr.	5,854,400	Agricultural	5,000,000	3,000,000
Ward 1-2-3-4	Clear Cr.	54,384,000	Agricultural	50,000,000	30,000,000

DIVISION NO. 1, DISTRICT NO. 7—Continued

Name of Reservoir	Source of Supply	Capacity in Cubic Feet	Ditch Supplied from Reservoir	Quantity of Water in Reservoir, Cubic Feet	
				May 1st	Nov. 1st
Lake 1-2-3	Clear Cr.	20,200,000	Agricultural	19,000,000	15,000,000
Wilbur	Clear Cr.	26,136,000	Golden Cy. and Ralston Cr.	25,000,000	3,000,000
Groves & Dolison	Clear Cr.	21,780,000	Golden Cy and Ralston Cr.	21,000,000	3,000,000
Gay	Clear Cr.	3,484,800	Golden Cy. and Ralston Cr.	3,000,000	
Legault	Clear Cr.	17,424,000	Golden Cy. and Ralston Cr.	17,000,000	2,000,000
Christman	Clear Cr.	5,445,000	Golden City and Ralston Cr.	5,000,000	
Church	Clear Cr.	13,068,000	Golden Cy. and Ralston Cr.	13,000,000	5,000,000
Copeland 1-2	Clear Cr.	4,356,000	Golden Cy. and Ralston Cr.	3,000,000	2,000,000
Leyden	Clear, Ralston and Leyden	78,408,000	Farmers Highline	60,000,000	40,000,000
Standley Lake	Clear and Ralston Cr's.	3,464,800,000			
Long Lake	Ralston	34,848,000	Long Lake Land & Res. Co.	34,848,000	34,848,000
Westminster	Clear Cr.	26,136,000		26,000,000	10,000,000
Loch Lomond 1-2-3-4-5	Clear Cr. and Fall River	21,780,000	Agricultural	21,780,000	
Tucker	Ralston	78,408,000	Tucker Lake Ditch	70,000,000	45,000,000
Broad & Hyatt 1-2	Clear Cr.	86,120,000	Farmers Highline	85,000,000	
Hockbury 1-2-3	Clear Cr.	6,969,000	Farmers Highline	6,500,000	4,000,000
Shoup 1-2	Clear Cr.	8,500,000	Farmers Highline	6,500,000	3,000,000
Lathrops 1-2-3	Clear Cr.	18,295,200	Farmers Highline	15,000,000	10,000,000
Calkins	Clear Cr.	16,988,400	Farmers Highline	15,000,000	5,000,000

DIVISION NO. 1, DISTRICT NO. 7—Concluded

Church	Clear Cr.	4,356,600	Farmers Highline	4,000,000	3,000,000
Green Lawn	Clear Cr.	4,791,600	Farmers Highline	4,600,000	2,000,000
Williams	Clear Cr.	3,920,400	Farmers Highline	3,000,000	2,000,000
Harrington	Clear Cr.	9,147,600	Farmers Highline	8,500,000	5,000,000
Storm & Rankins	Clear Cr.	9,583,200	Farmers Highline	9,000,000	7,000,000
Burnett	Clear Cr.	3,920,400	Farmers Highline	3,500,000	3,000,000
Freys	Clear Cr.	6,969,600	Farmers Highline	6,500,000	4,000,000
Vogle	Clear Cr.	3,484,800	Farmers Hihgline	3,000,000	2,000,000
Heintze	Clear Cr.	4,791,600	Farmers Highline	4,000,000	3,000,000
Hussey	Clear Cr.	3,920,400	Farmers Highline	3,500,000	2,000,000
Crokes 1-2-3-4-5	Clear Cr.	39,204,000	Farmers Highline	35,000,000	20,000,000
Finnerty	Clear Cr.	2,613,600	Farmers Highline	2,500,000	1,000,000
Webster	Clear Cr.	6,969,600	Farmers Highline	6,500,000	5,000,000
Browns	Clear Cr.	13,939,200	Farmers Highline	12,000,000	8,000,000
Hallick	Clear Cr.	5,227,200	Farmers Highline	5,000,000	3,000,000
Smith	Clear Cr.	3,920,400	Farmers Highline	3,000,000	2,000,000
Brown	Clear Cr.	5,227,200	Farmers Highline	5,000,000	3,000,000
Brewer	Clear Cr.	3,920,400	Farmers Highline	3,500,000	2,000,000
East Lakes 1-2-3-4	Clear Cr.	52,722,000	Farmers Highline	46,000,000	30,000,000
King & Wooley	Clear Cr.	23,958,000	Farmers Highline	21,000,000	15,000,000
Johnson	Clear Cr.	3,049,000	Farmers Highline	3,000,000	2,000,000
Paits	Clear Cr.	5,227,200	Farmers Highline	5,000,000	3,000,000
Wadley	Clear Cr.	13,939,200	Farmers Highline	12,000,000	7,000,000

DIVISION NO. 1, DISTRICT NO. 8

Name of Reservoir	Source of Supply	Capacity in Cubic Feet	Ditch Supplied from Reservoir	Quantity of Water in Reservoir, Cubic Feet	
				May 1st	Nov. 1st
Castlewood	Cherry Cr.	261,360,000	Arapahoe	261,360,000	108,900,000
Clark	Cherry Cr.	108,900,000	Arapahoe	108,900,000	21,780,000
DIVISION NO. 1, DISTRICT NO. 9					
Soda Lake No. 1	Bear Cr.	10,500,000	Arnett	10,500,000	5,500,000
Soda Lake No. 2	Bear Cr.	76,860,000	Arnett	76,860,000	0
Harriman	Bear Cr.	38,000,000	Johnson	38,000,000	36,000,000
Stickfort	Bear Cr.	1,000,000	Rucker	800,000	500,000
Henry	Bear Cr.	6,600,000	Henry	6,000,000	4,200,000
Henry Lake	Bear Cr.	8,700,000	Henry Lake	8,000,000	5,750,000
Fort Logan	Bear Cr.	348,480	Logan	348,480	180,000
Rucker	Bear Cr.	1,100,000	Rucker	226,600	1,000,000
Johnson	Bear Cr.	11,200,000	Dutch Cr.	11,200,000	5,600,000
Grant No. 1	Bear Cr.	4,900,000	Grant	4,000,000	3,400,000
Grant No. 2	Bear Cr.	3,200,000	Grant	1,600,000	2,000,000
Grant No. 3	Bear Cr.	3,000,000	Grant	1,500,000	200,000
N. B. Coy No. 1	Bear Cr.	1,100,000	Coy	900,000	900,000
N. B. Coy No. 2	Bear Cr.	300,000	Coy	200,000	0
Bowles No. 1	Bear Cr.	76,000,000	Bowles	75,000,000	68,425,560

DIVISION NO. 1, DISTRICT NO. 9—Concluded

Bowles No. 2	Bear Cr.	15,681,600	None	15,681,600	15,681,600
Bowles No. 3	Bear Cr.	2,613,600	Bowles	2,613,600	2,613,600
Bowles No. 4	Bear Cr.	2,395,800	Bowles	2,395,800	2,395,800
Marston	Bear Cr. and Platte R.	853,200,000	Filters	703,000,000	437,544,000
Bergen No. 1	Turkey Cr.	16,345,300	Bergen	16,345,300	0
Bergen No. 2	Turkey Cr.	24,984,500	Bergen	24,984,500	0
Brooks	Turkey Cr.	435,600	Brooks	435,600	0
Dean	Turkey Cr.	17,424,000	Dean	17,424,000	0
J. B. Grant No. 1	Turkey Cr.	4,356,000	Grant	4,356,000	0
J. B. Grant No. 2	Turkey Cr.	522,720	Grant	522,720	0
Sharer	Turkey Cr.	4,356,000	Sharer	3,356,000	0
Grant No. 7	Turkey Cr.	784,080	No. 7	600,000	0
Shepard	Turkey Cr.	2,439,360	Shepard	0	0
Gulch	Turkey Cr.	4,201,252	Gulch	3,547,820	0
Kendrick	Bear Cr.	5,227,220	Kendrick	3,277,000	0
Ward & Kendrick	Bear Cr.	17,424,000	Ward & Kendrick	15,682,000	7,500,000
Smith	Bear Cr.	15,424,000	Green	11,939,200	5,000,000
Porter	Bear Cr.	522,720	Porter	522,720	400,000
Deutcher & Reynolds	Bear Cr.	3,267,000	Deutcher	3,267,000	1,200,000
Rollins No. 1	Bear Cr.	3,484,800	Rollins	2,613,600	2,613,600
Rollins No. 2	Bear Cr.	653,400	Rollins	653,400	653,400

DIVISION NO. 2, DISTRICT NO. 11

Name of Reservoir	Source of Supply	Capacity in Cubic Feet	Ditch Supplied from Reservoir	Quantity of Water in Reservoir, Cubic Feet	
				May 1st	Nov. 1st
Evans Gulch	Evans Stream	1,439,000	Leadville Water Co.	1,000,000	1,000,000
Big Evans Gulch No. 2	Evans Stream	2,000,000	Stevens & Leiter	1,000,000	700,000
Mountain Lake	Springs	5,333,333	Leadville Water Co.	3,000,000	1,500,000
Boss Lake	Springs	26,832,960	So. Arkansas	26,832,960	0
Sugar Loaf	Lake Fork	756,666,666	Arkansas R.	577,257,120	523,809,000
Clear Creek	Clear Creek	409,537,600	Otero Irrigation	300,654,420	0
Twin Lakes	Lake Cr.	....	Colorado	....	....
DIVISION NO. 2, DISTRICT NO. 12					
Schaeffer	Beaver Cr.	137,151,000	Beaver Water & Irr. Co.	128,600,000	40,000,000
Skagway	Beaver Cr.	144,000,000	Power	64,496,000	97,600,000
Victor No. 2	East Br. W. Beaver	9,105,000	Victor Water System	2,400,000	9,000,000
Bison Basin	East Br. W. Beaver	45,000,000	Victor Water System	0	15,000,000
Colo. Springs No. 4	Middle Beaver	115,272,000	Colo. Spgs. Water System	53,300,000	53,000,000
Colo. Springs No. 2	Middle Beaver	13,000,000	Colo. Spgs. Water System	13,000,000	13,000,000
Colo. Springs No. 5	Middle Beaver	86,000,000	Colo. Spgs. Water System	63,000,000	75,000,000
Colo. Springs No. 7	East Br. W. Beaver	6 600,000	Colo. Spgs. Water System	0	6,600,000
Colo. Springs No. 8	East Br. W. Beaver	23,324,000	Colo. Spgs. Water System	3,600,000	3,000,000
Gillette	South Fk. Oil Cr.	500,000	Town of Gillette	200,000	300,000

DIVISION NO. 2, DISTRICT NO. 12—Concluded

Cripple Creek W. Co. No. 1	W. Br. W. Beaver	16,600,000	Cripple Creek W. Co.	3,000,000	16,600,000
Cripple Creek W. Co. No. 2	W. Br. W. Beaver	6,600,000	Cripple Creek W. Co.	0	6,600,000
Mt. Pisgah	Four Mile Cr.	138,000,000	Park Center and others	31,874,000	13,905,000
Cedar Park	Eight Mile Cr.	1,000,000		0	
Roosevelt	Stout Cr.	5,000,000	West Side	0	
Curtis	Stout Cr.	3,000,000	West Side	0	
Taylor	Stout Cr.	300,000	West Side	0	
DIVISION NO. 2, DISTRICT NO. 14					
Lake Henry	Arkansas R.	117,742,680	Sugar City Lat.		
Lake Meredith	Arkansas R.	678,359,880		392,040,000	
Green View	Fountain R.	2,613,600			
Pueblo W. Co. No. 1	Arkansas R.	679,000	City of Pueblo		
Pueblo W. Co. No. 2	Arkansas R.	767,180	City of Pueblo		
Pueblo W. Co. No. 3	Arkansas R.	955,441	City of Pueblo		
Pueblo W. Works No. 1	Arkansas R.	1,740,000			
Pueblo W. Works No. 2	Arkansas R.	1,760,000			
Turkey Creek	Turkey Creek	580,654,800	Teller	24,785,640	11,979,000
DIVISION NO. 2, DISTRICT NO. 15					
Minnequa	Drainage and seepage	60,000,000	Steel Works	49,213,636	57,181,149
Savard	Arkansas R.	69,000,000	Steel Works	44,316,844	76,650,802
Corwin	Arkansas R.	141,000,000	Steel Works	77,911,911	133,628,760

DIVISION NO. 2, DISTRICT NO. 16

Name of Reservoir	Source of Supply	Capacity in Cubic Feet	Ditch Supplied from Reservoir	Quantity of Water in Reservoir, Cubic Feet	
				May 1st	Nov. 1st
Cucharas No. 5	Cucharas R.	1,807,740,000	Orlando No. 5	86,684,400	0
Bradford Lake	Huerfano	1,843,459,200	Orlando No. 5	215,970,480	0
Maria	Cucharas	10,394,200		0	0
C. T. Richie	Cucharas	1,200,000		0	0
Robinson	Muddy Cr.	2,500,000		0	0
Hayes	Cucharas	1,448,400		0	0
Montez	Huerfano	251,400		0	0
Huerfano Valley	Huerfano	87,855,600		0	0
La Joya	Cucharas	7,741,400		0	0
Stevens	Bear R.	91,150,000		0	0
Pope Bros.	Huerfano	4,024,238		0	0
McMillan	Huerfano	1,045,000		0	0
Sharps Orchard	Cucharas	3,696,000		0	0
Ellis	Huerfano	450,000		0	0
McDonald	Cucharas	91,150		0	0
Archuleta	Huerfano	569,400		0	0
Holita	Cucharas	23,524,020		0	0
Lake Oehm	Cucharas	171,543,950		88,794,450	0
Walsenburg	Cucharas	17,933,400		0	0
Apache	Apache	50,946,205		0	0

DIVISION NO. 2, DISTRICT NO. 17

Lake No. 1	Arkansas R.	326,700,000	Holbrook	326,700,000	43,560,000
Dye	Arkansas R.	196,020,000	Holbrook	196,020,000	0
Horse Creek	Ark. R. and Horse Cr.	1,171,163,000	Fort Lyon	174,240,000	0
Adobe Creek	Ark. R. and Adobe Cr.	2,682,207,000	Fort Lyon	174,240,000	0
Timpas No. 2	Timpas Cr.	128,585,000	Lateral No. 2		0
Timpas No. 3	Timpas Cr.	79,725,000	Lateral No. 3	21,180,000	0
Red Top	Mustang Cr.	26,136,000	Red Top		
Hardesty	Mustang Cr.	6,846,000	Hardesty No. 1		
Bruin (Mustang)	Mustang Cr.	144,000,000	Lat. No. 1		
Swink No. 1	Apishapa Cr.	100,318,000	Lat. No. 1		
Swink No. 2	Apishapa Cr.	12,167,800	Lat. No. 2		
Box Spring	Horse Cr.	162,000,000	Box Springs	42,280,000	
Thurston	Arkansas R.	348,480,000	Fort Lyon	174,240,000	
Nee Skah	Arkansas R.	1,120,276,000	Amity, Pawnee, Comanche		
Nee Nosbe	Arkansas R.	3,195,578,720	Amity, Pawnee, Comanche		
Nee Sopah	Arkansas R.	1,109,908,800	Amity, Pawnee, Comanche		
Nee Gronda	Arkansas R.	2,566,328,000	Amity, Pawnee, Comanche		
Prairie	Dry Cr.				
DIVISION NO. 2, DISTRICT NO. 19					
Model	Las Animas and Tribs.	886,883,220	Model L. & I. Co.'s	52,200,000	
Johns Lake	Las Animas	1,935,000			
North Lake	Las Animas	44,000,000	Trinidad Pipe L.	40,000,000	44,000,000

DIVISION NO. 2, DISTRICT NO. 19—Concluded.

Name of Reservoir	Source of Supply	Capacity in Cubic Feet	Ditch Supplied from Reservoir	Quantity of Water in Reservoir, Cubic Feet	
				May 1st	Nov. 1st
Monument Lake	Las Animas	7,000,000	Woodruff	7,000,000	7,000,000
Madrid No. 1	Las Animas	1,334,000	Trinidad Pipe L.	1,334,000	1,334,000
Madrid No. 2	Las Animas	1,334,000	Trinidad Pipe L.	1,334,000	1,334,000
Madrid No. 3	Las Animas	8,000,000	Trinidad Pipe L.	6,000,000	3,000,000
Jansen	Las Animas	800,000	Trinidad Pipe L.	800,000	800,000
Maple Street	Las Animas	170,000	Trinidad Pipe L.	150,000	160,000
Russell	Whiskey Cr.	13,590,000	Russell and Storg	10,000,000	10,000,000
DIVISION NO. 3, DISTRICT NO. 22					
Cove Lake	San Antonio and Conejos	250,000,000	North and South Laterals	100,000,000	0
DIVISION NO. 4, DISTRICT NO. 34					
Bauer Lake No. 2	Chicken Cr.	80,000,000	Bauer Lake	5,000,000	50,000,000
Bauer Lake No. 1	Chicken and Crystal Crs.	30,000,000		1,000,000	12,000,000
Summit	Los Canon	174,240,000		20,000,000	0
Puett	Los Canon				
Joe Moore	Los Canon		Los Canon		0
Webber	Middle Mancos	13,000,000	Webber	7,000,000	0

DIVISION NO. 5, DISTRICT NO. 38

Spring Park	Cattle Cr.			26,136,000	6,584,000
Miller	Coulter Cr.			0	0
Hopkins	Drainage	1,098,000	Hopkins	1,098,000	0
Watters	Drainage	1,088,000		1,088,000	0
McKensie	Wild Cat Cr.	1,189,680	Lateral	1,189,680	0
Van Cleave-Fisher	Mesa Cr.	1,524,600	Laterals	1,524,600	0
Mt. Sopris	Sopris Cr.		Mt. Sopris	0	0
Pat McNulty	Cottonwood Cr.	1,393,930	Laterals	1,393,930	0
Bourg	Dry Woody	27,000	Laterals	27,000	15,000
Kelly Pond	Drainage	7,391,875	Kelly Pond	7,391,875	2,465,625
Thomas	Thomas Cr.				0

DIVISION NO. 5, DISTRICT NO. 39

Antlers	E. Br. Rifle Cr.	174,244,335	Antlers	130,680,000	0
Harris	W. Br. Rifle Cr.		Geo. E. Harris	3,267 000	0
Park	W. Elk Cr.	7,753,680	Saint	6,534,000	0
Rifle Valley	Rifle Cr.	29,620,800		2,178,000	0
Thompson	W. Rifle Cr.	653,400	Clark	348,480	0
Saint	W. Elk Cr.	653,400	Saint	0	0
Cozza		435,600	Cozza	217,800	0

DIVISION NO. 4, DISTRICT NO. 42

Name of Reservoir	Source of Supply	Capacity in Cubic Feet	Ditch Supplied from Reservoir	Quantity of Water in Reservoir, Cubic Feet	
				May 1st	Nov. 1st
Fish Lake	Snow		Parker Basin	0	0
Cottonwood No. 1	Snow			0	0
Cottonwood No. 2	Snow			Two-thirds full	0
Cottonwood No. 4	Snow	62,850,606	All ditches on Cottonwood Cr.	Full	0
Cottonwood No. 5	Snow			0	0
Meadow Lake No. 2	Snow			One-half full	0
Meadow Lake No. 3	Snow			One-third full	0
Big Creek	Snow			0	0
Bonham	Snow	103,593,412	All ditches on Big Creek	0	0
Atkinson	Snow			0	0
Bull Creek Nos. 1-2-4-5	Snow	9,211,652	All ditches on Bull Creek	0	0
Coon Creek Nos. 1-2-4	Snow	13,658,674	Ellsbury	0	0
Mesa Creek No. 1	Snow			One-half full	0
Mesa Creek No. 4	Snow			0	0
Mesa Creek No. 3	Snow	39,002,756	All ditches on Mesa Creek	0	0
Summit No. 1	Snow			0	0
Summit No. 2	Snow			0	0
Grand Mesa Nos. 1-6-9-8	Snow	47,677,291	All ditches on Kannah Cr.	0	0
Dry Creek	Snow	8,890,279	Juniata, Highline and Berry	0	0

DIVISION NO. 5, DISTRICT NO. 44

Martin's	Martin's Creek	30,492,000	Martin's	30,492,000	0
Wyman	Little Beaver	4,791,600	Yellow Jacket 1 and 2	4,791,600	0
DIVISION NO. 1, DISTRICT NO. 48					
Porter Lake	Porter and Nunn Crs	10,140,425		0	0
Lost Lake	Drainage		Chambers Lake	4,000,000,	0
Laramie Lake	Drainage		Chambers Lake	4,000,000	
DIVISION NO. 5, DISTRICT NO. 58					
Gardner Park	Drainage	47,916,000	Stillwater	40,000,000	0
Wheeler	Lake Cr.	1,600,000	Wheeler No. 3	1,600,000	1,600,000
Chambers	Drainage	4,000,000		2,110,000	0
B. L. Allin	Trull Cr.	6,503,805			
Heart Lake	Watson Cr.	12,000,000	Ditches from Watson Cr.	12,000,000	6,000,000
DIVISION NO. 4, DISTRICT NO. 60					
Gurley	Beaver Cr.	28,000,000	Gurley	0	0
Lone Cone	Naturita and Brewster	77,000,000	Lone Cone	68,000,000	500,000

DIVISION NO. 1, DISTRICT NO. 64

Name of Reservoir	Source of Supply	Capacity in Cubic Feet	Ditch Supplied from Reservoir	Quantity of Water in Reservoir, Cubic Feet	
				May 1st	Nov. 1st
Jumbo	So. Platte River	1,227,445,000	Jumbo Highline, Settlers, Peterson	986,961,000	269,390,000
Prewitt	So. Platte River	1,429,831,368	Schneider, Pawnee, Davis Bros., Iliff and Platte Valley, Springdale, Bravo, Powell & Dillon, Ramsey, Powell, Harmony Nos. 1-2-3, Farmers	375,000,000	31,300,000
Point of Rocks	So. Platte River	3,543,111,030	Point of Rocks	1,263,675,600	23,156,060
DIVISION NO. 1, DISTRICT NO. 65					
Holy Joe	Holy Joe Cr.	1,000,000	Holy Joe		500,000
Rush Creek	Rush Cr.	2,000,000	Rush Cr.		1,500,000

DIVISION NO. 1, DISTRICT NO. 1—1914

NAME OF DITCH	Amount of Appropriation in Cu. Ft. Per Sec.	First Day Water Used	Last Day Water Used	Number of Days Water Carried from Natural Stream	Average Daily Amount of Water During Season	Number of Acre-Feet Used During Season	Number of Acres Irrigated	Duty in Acre-Feet Per Acre
Hoover	45.	May 8	Oct. 31	167	11	3684	860	4.20
Riverside	270	May 11	Oct. 12	64	185	23700	14610	1.62
Bijou	204	May 4	Oct. 1	142	229	65164	13720	4.76
Corona Ranch	56	May 1	Aug. 1	90	11	1990	781	2.54
Shultz	28						800	
Putnam	40	May 4	Nov. 1	162	12	4110	2505	1.64
Weldon Valley	165	May 11	Oct. 31	169	89	30400	6500	4.68
Ft. Morgan	323	May 11	Oct. 31	170	171	58310	12000	4.86
Upper Platte and Beaver	251	Mch. 27	Nov. 1	163	106	34610	11500	3.01
Deuel and Snyder	45	May 4	Oct. 31	167	18	6270	2000	3.14
Brown and Piatt	39	May 4	Aug. 17	83	15	2540	500	5.08
Lower Platte and Beaver	322	May 4	Oct. 31	179	133	47870	15000	3.19
Tremont	150	Apr. 5	Oct. 31	144	30	8650	2000	4.32
Huston	175	Apr. 10	Oct. 25	110	28	6360	1900	3.35
Cooper	90	May 1	Oct. 31	83	12	2132	1600	1.33
Union	46	Aug. 1	Aug. 17	15	23	690	1080	.64
Johnson and Edwards	59	May 20	Oct. 31	153	24	6700	2460	2.72
Tetsel	37	May 11	Oct. 31	165	13	4380	1467	2.98
Beaver	44	May 12	Oct. 31	169	5	1746	500	3.49

DIVISION NO. 1, DISTRICT NO. 2

Brantner	111.18	May 11	Oct. 22	165	40	13200	4560	2.88
Platteville	147.38	May 1	Oct. 22	175	43	15050	2112	7.14
Lupton Bottom	140.57	May 1	Oct. 21	174	26	9048	1633	5.53
Brighton	44.8	May 1	Oct. 22	175	27	9450	2615	3.62
Duggan	27.	May 1	Oct. 22	175	20	7000	411	17.00
Fulton	448.8	May 1	Oct. 22	171	122	41724	10595	3.94
Farmer's Independent	458.4	May 18	Sept. 30	135	105	28350	6835	4.15
Meadow Island No. 1	26.23	May 20	Sept. 30	153	10	3060	625	4.90
Meadow Island No. 2	66.	May 21	Oct. 10	94	12	2256	697	3.23
Hewes and Cook	98.57	May 23	Sept. 7	96	53	10176	7100	1.43
Lower Latham	287.73	May 16	Oct. 12	150	105	31500	8315	3.78
Section No. 3	57.7	May 20	Oct. 12	138	14	3864	1413	2.74
Patterson								
Highland	64.4	July 1	Aug. 20	51	6	612	410	1.49
Union	184.03	May 12	Oct. 12	154	91	28028	5204	5.43
Evans No. 2	404.05	May 14	Oct. 12	147	96	28224	6206	4.50
Beeman	127.	May 21	Oct. 12	132	21	5544	1155	4.78
Bucker's	121.87	May 10	Oct. 12	127	34	8636	5205	1.66
Burlington	350.	May 1	Oct. 22	164	116	38048	15540	2.45
Lupton Short Line	72.	June 9	Sept. 8	73	38	5548	410	13.54
Elwood	37.6	June 1	Aug. 1	61	5	610	305	2.00

DIVISION NO. 1, DISTRICT NO. 3

NAME OF DITCH	Amount of Appropriation in Cu. Ft. Per Sec.	First Day Water Used	Last Day Water Used	Number of Days Water Carried from Natural Stream	Average Daily Amount of Water During Season	Number of Acre-Feet Used During Season	Number of Acres Irrigated	Duty in Acre-Feet Per Acre
Dry Creek	50.92	May 11	Sept. 30	143	20	5720	2380	2.40
Pleasant Valley	138	May 14	Sept. 18	128	46	11776	7000	1.68
Boyd and Freeman	99	July 3	Sept. 11	71	8.5	1207	700	1 72
Whitney	61	June 8	Sept. 30	109	25	5450	2500	2.18
B. H. Eaton	41	June 8	Sept. 22	107	10	2140	1100	1.94
Larimer and Weld	720	May 16	Sept. 24	132	210	55440	58000	.96
John G. Coy	31	May 15	Sept. 22	100	8	1600	290	5.50
Box Elder	52.7	May 18	Sept. 24	130	10	2600	2000	1.30
Josh Ames	36	May 20	Sept. 3	107	7	1498	710	2.11
Little Cache la Poudre	82.5	May 18	Sept. 12	93	15	2790	1650	1.69
Fort Collins	130	May 7	Oct. 3	148	14	4144	3600	1.15
New Mercer	163	May 6	Sept. 3	112	30	6720	6700	1.00
Canal No. 3	173	May 11	Oct. 4	147	70	20580	4000	5.13
Cache la Poudre	585	May 14	Aug. 30	94	296	55648	47000	1.18
Lake	158	May 13	Aug. 2	61	87	10614	8000	1.32
Larimer Co. No. 2	175	May 7	Sept. 25	142	42	11928	7200	1.66
Larimer Co.	463	May 18	Sept. 22	128	260	66560	50000	1.33
Ogilvy	57.6	May 12	Oct. 5	140	28.6	8008	4000	2.00

DIVISION NO. 1, DISTRICT NO. 4

Supply Lateral	74.57	May 31	Aug. 29	81	12	1944	1135	1.71
Boulder and Larimer Co.	66.72	May 31	June 24	25	21	1050	1995	.52
Blowes No. 1	44.93	June 29	Aug. 29	48	4	384	320	1.20
Miner and Lougan	40.8	June 21	Aug. 29	67	7	938	600	1.55
Handy	192.43	May 17	Oct. 16	151	53	16006	13360	1.20
Home Supply	278.84	May 17	Oct. 16	153	50	15300	22125	.69
South Side	50.3	May 25	Oct. 16	137	8	2192	3250	.68
Louden	317.78	May 10	Oct. 31	175	43	15226	14900	1.02
Geo. Rist	195	May 17	Aug. 5	81	37	6074	5175	1.30
Barnes	43.86	May 20	Sept. 30	91	16	3002	1890	1.59
Rist and Goss	86.48	May 25	Sept. 7	106	5	1060	435	2.44
Loveland and Greeley	408	May 17	Oct. 19	112	120	26880	19200	1.40
Big Thompson D. & Mfg. Co.	146.25	May 29	Sept. 30	119	12	2976	1905	1.56
Farmers'	63.9	May 28	Sept. 28	121	14	3388	4090	.83
Hillsboro	153	May 20	Oct. 5	139	59	16402	11060	1.48
Hill & Brush	61.8	June 15	Sept. 26	100	11	2200	1435	1.53
Big Thompson and Platte River	121.18	May 1	Sept. 22	145	15	4350	1985	2.20
Bee Line	40	May 1	Sept. 22	145	23	6670	450	14.80

DIVISION NO. 1, DISTRICT NO. 5

South Ledge	30.4	May 13	Aug. 26	94	8.1	1522	1170	1.30
Supply	92.2	May 24	Oct. 2	113	43.8	9894	10825	.92
Highland	325	Mch. 13	Oct. 7	171	150.5	51470	28706	1.97
Rough and Ready	83.34	Mch. 13	Sept. 26	162	25.5	8262	4570	1.81

DIVISION NO. 1, DISTRICT NO. 5—Concluded.

NAME OF DITCH	Amount of Appropriation in Cu. Ft. Per Sec.	First Day Water Used	Last Day Water Used	Number of Days Water Carried from Natural Stream	Average Daily Amount of Water During Season	Number of Acre-Feet Used During Season	Number of Acres Irrigated	Duty in Acre-Feet Per Acre
St. Vrain and Palmerton	164.31	Apr. 27	Oct. 7	163	10.62	3560	1500	2.37
Montgomery	31.96	June 12	Aug. 26	40	2	160	115	1.39
Longmont Supply	53.4	May 31	Sept. 23	114	12.3	2812	3415	.82
Oligarchy	237.51	Mch. 14	Sept. 26	145	38	5510	4355	1.27
Chapman and McCaslin	98.18	Mch. 24	Sept. 12	85	2.2	374	500	.75
James	27.11	June 2	Oct. 1	122	3.6	876	3250	.27
Denio and Taylor	41.18	June 3	Oct. 1	117	6	1404	895	1.57
Zweck and Turner	82.61	June 5	Oct. 1	110	6.2	1364	655	2.08
Pella	42.64	May 24	Sept. 25	123	7	1722	1050	1.64
Ni Wot	35.96	June 4	Sept. 20	106	2.8	592	805	.74
South Flat	71.43	June 8	Sept. 30	114	8	1824	905	2.02
Last Chance	96.84	June 4	Aug. 25	62	31	3844	2062	1.86
Hayseed	41.54	June 22	Aug. 31	50	1.6	160	220	.73
J. W. Goss No. 2	29.51	June 20	Aug. 15	47	1.3	126	295	.43
Goss Private	25.01	June 20	Aug. 24	50	1.6	160	405	.40
Left Hand	726	June 20	Sept. 24	92	25.	4600	15750	.29

DIVISION NO. 1, DISTRICT NO. 6

Howard	36	June 11	Nov. 11	148	5.3	2068	1210	1.71
Schearer	26.08	June 18	Oct. 5	67	1.3	186	200	.93
East Boulder	102.3	Mch. 30	Oct. 22	111	4.1	916	907	1.01
Cottonwood No. 2	33.7	June 11	Sept. 19	110	8.4	1858	740	2.51
Dry Creek Davidson	29.95	June 12	Oct. 14	98	5.8	1144	810	1.42
Dry Creek No. 2	69.	June 11	Nov. 12	155	5.7	1784	1270	1.4
Enterprise	34.08	June 11	Oct. 15	130	4.8	1254	1230	1.02
Leyner and Cottonwood No. 1	82.	June 8	Oct. 31	111	16.1	3358	3505	.96
Marshallville	45.92	June 11	Oct. 19	70	13.1	1836	1665	1.1
So. Boulder Canon	26.37	June 5	Oct. 29	65	22.2	2886	3195	.905
Davidson	116.3	Mch. 23	Sept. 22	54	48	5204	7435	.7
Goodhue or Rock Creek	96.24	May 17	Oct. 27	59	51.9	6130	7440	.69
So. Boulder and Coal Creek	53.55	June 8	Oct. 31	51	20.1	2052	3055	.67
Community	85.3	Jan. 11	June 24	132	42.4	11176	11410	.98
Lower Boulder	122	June 7	Oct. 12	123	46.5	11462	10000	1.14
Smith and Goss	44.36	June 10	Nov. 1	145	2.9	854	220	3.87
Anderson	25	June 8	Nov. 11	125	10.5	2652	850	3.12
Godding, Daly and Plum	30.44	June 7	Oct. 9	124	10.5	2606	551	4.72
N. Boulder Farmers'	58	June 10	Oct. 1	109	15.6	3382	3355	1.01
P. M. Rural	220	June 7	Oct. 14	109	27.8	5904	3160	1.87
Green	34.58	June 10	Sept. 1	67	5	670	530	1.26
Farmers'	73.29	June 6	Oct. 1	100	33.3	6670	3575	1.86
Smith and Emmons	47.16	June 7	Oct. 9	117	9.4	2206	728	3.04

DIVISION NO. 1, DISTRICT NO. 6—Concluded

NAME OF DITCH	Amount of Appropriation in Cu. Ft. Per Sec.	First Day Water Used	Last Day Water Used	Number of Days Water Carried from Natural Stream	Average Daily Amount of Water During Season	Number of Acre-Feet Used During Season	Number of Acres Irrigated	Duty in Acre-Feet Per Acre
Carr and Tyler	33.75	June 7	Sept. 27	90	5.3	966	165	5.78
Butte Mill	110.86	June 13	Sept. 9	55	8.2	904	1005	.899
Tom Delehant	37.12	June 7	Sept. 28	107	5.1	1042	500	2.08
Godding	99.7	June 7	Aug. 11	64	39.5	5068	1345	3.77
Leggett or Charity	31.35	June 7	Oct. 11	73	28.8	4202	4570	.92
Boulder and Weld Co.	59.4	June 7	Aug. 7	61	17.6	2152	2685	.8
Boulder and White Rock	190.58	June 4	Aug. 9	63	70	8826	7525	1.17
DIVISION NO. 1, DISTRICT NO. 7								
Golden	720.66	Mch. 14	Nov. 14	216	100	43280		
Clear Creek and Platte R.	70.06	May 19	Oct. 22	154	20	6170		
Rocky Mt.	190	May 5	Oct. 14	134	60.83	16310		
Lee, Stewart and Eskins	33.19	May 8	Oct. 18	148	9.65	2834		
Golden City and Ralston Cr.	110.	May 23	Nov. 15	135	68.9	18598		
Golden City	26.	May 21	Nov. 15	119	20	47.82	5900	.81
Agricultural	150	May 21	Nov. 15	87	59.7	10380	13200	.78
Colo. Agricultural	62	May 21	Oct. 22	152	20.18	6130	2450	2.5
DIVISION NO. 1, DISTRICT NO. 8								
Platte Water Co.	89.95	Mch. 31	Oct. 30	210	43	15824	1500	10.55
Nevada	62.3	May 10	Nov. 10	180	50	18000	1740	10.35

DIVISION NO. 1, DISTRICT NO. 8—Concluded.

Platte Canon	56	May 15	Oct. 15	150	20	6000	924	6.5
Last Chance	32	May 15	Nov. 1	165	25	8250	1100	7.5
No. Colo. Irrig. Co.	1184	Apr. 24	Oct. 31	188	278	104528	28000	3.73
First Attempt	32	June 15	Oct. 15	120	6	1400	42	33.4
Arapahoe	50	May 1	Oct. 15	165	50	16500	10000	1.65
Fairview	52	....	....	....	....	250	150	1 67
DIVISION NO. 1, DISTRICT NO. 9								
Simonton	35.76	July 1	Aug. 5	24	11.2	538	426	1.26
Warrior	52.52	June 9	Oct. 23	137	21.8	5973	1456	4.1
Pioneer Union	55.67	June 1	Oct. 23	139	14.8	4014	711	5.65
Lewis and Strouse	30.68	June 1	Oct. 8	54	1.6	172	30	5.73
Ward	63.	Apr. 9	Oct. 30	124	10.5	2604	1479	1.76
Arnett	56.65	Mch. 8	Oct. 30	231	31.	14322	2821	5.08
DIVISION NO. 2, DISTRICT NO. 10								
Fountain	29.09	July 1	Oct. 1	41	29.09	2389	282	8.42
Chilcott	27.	July 24	Oct. 15	161	27.	8694	1213	7.16
Widefield	26.75	July 1	....	90	26.73	4814	852	5.64
DIVISION NO. 2, DISTRICT NO. 11								
Mo. Park	40	May 1	Nov. 1	90	30	5400	1370	3.94
Bowen	50.9	June 1	Sept. 15	90	35	6200	....	....
Sunnyside Park	29.17	May 1	Nov. 1	150	10	3000	373	8.04
Starr	52.15	June 1	Sept. 1	90	30	.5400	....	....
Stevens and Leiter	36.	Jan. 1	Jan. 1, 15	365	36	26280	....	....

DIVISION NO. 2, DISTRICT NO. 11—Concluded.

NAME OF DITCH	Amount of Appropriation in Cu. Ft. Per Sec.	First Day Water Used	Last Day Water Used	Number of Days Water Carried from Natural Stream	Average Daily Amount of Water During Season	Number of Acre-Feet Used During Season	Number of Acres Irrigated	Duty in Acre-Feet Per Acre
Salida Power and Utility Co.	136.6							
B. V. Smelting and R. Co.	115							
Cache Creek	40							
Clear Creek	50							
Arlington	50							
Colo. Gulch Placer	30							
DIVISION NO. 2, DISTRICT NO. 12								
Park Center	28.92	Nov. 5, 13	Oct. 29	168	18	6048	1471	4.1
Beaver W. & I. Co.	58.	Nov. 1, 13	Oct. 31	326	16.88	11008	4850	2.28
Union	48	Nov. 1, 13	Oct. 31	349	25.71	18746	920	20.4
So. Canon	40	Nov. 1, 13	Oct. 31	240	26.	12674	1400	9.04
Canon City and Hydraulic	77	Nov. 1, 13	Oct. 31	352	46.	32944	2750	11.55
Canon City and Oil Creek	33.6	Nov. 1, 13	Oct. 31	298	20.9	12460	1210	10.3
DeWeese-Dye	28.25	Nov. 2, 13	Oct. 31	198	12.28	4684	1150	4.06
Tremont W. S. Co.	57.	Nov. 1, 13	Oct. 31	189	2.17	822	160	5.13
Arkansas Valley Conduit	70.	Nov. 1, 13	Oct. 31	233	63.6	51642		

DIVISION NO. 2, DISTRICT NO. 14								
Oxford Farmers'	116	Feb. 16	Oct. 31	230.5	54.6	25174	6000	4.19
Bessemer	370	Jan. 1	Oct. 31	288.	141.	81166	19790	4.1
Collier	26	......	......	......	......	......	1560	......
Excelsior	60	Apr. 29	Oct. 31	104	32.9	6840	2770	2.47
Pueblo Water Wks.	46	......	......	......	......	......	......	......
High Line	468.5	Nov. 1, 13	Oct. 31	329	138	91000	28000	3.24
Colorado	756.28	Jan. 8	Oct. 28	122	184	44884	45200	.995
DIVISION NO. 2, DISTRICT NO. 16								
Montez	37.64	Apr. 10	Aug. 15	50	8	800	......	......
Huerfano Valley	42	Jan. 17	Sept. 25	176	29.9	8262	3017	2.74
DIVISION NO. 2, DISTRICT NO. 17.								
Rocky Ford	209	Nov. 16, 13	Nov. 15	329	71	46756	9665	4.83
Las Animas Consolidated	129.5	Nov. 16, 13	Nov. 15	224	42.6	18104	6220	2.90
Las Animas Town	32.5	Nov. 16, 13	Nov. 15	330	21	13866	2460	5.64
Ft. Lyon	933	Nov. 16, 13	Nov. 15	360	440.2	316978	84400	3.75
Catlin	345	Nov. 16, 13	Nov. 15	325	120	79638	19880	4.0
Lake or Holbrook	600	Dec. 2, 13	Oct. 30	219	136	59686	20000	2.98
Otero	457.92	May 2	Oct. 19	117	137.7	32322	17700	1.83
Timpas Creek	51.84	May	Oct.	......	......	......	......	......
Omer	120.4	May 1	Sept.	120	60	14400	2000	7.20
Carmen	60	Apr. 15	Nov. 15	183	30	10980	2800	3.92
DIVISION NO. 2, DISTRICT NO. 19								
Baca Consolidated	95.49	May 12	Sept. 26	134	......	......	4556	......
Pulaski	163.56	Apr. 18	Nov. 1	192	......	......	6822	......

DIVISION NO. 3, DISTRICT NO. 21

NAME OF DITCH	Amount of Appropriation in Cu. Ft. Per Sec.	First Day Water Used	Last Day Water Used	Number of Days Water Carried from Natural Stream	Average Daily Amount of Water During Season	Number of Acre-Feet Used During Season	Number of Acres Irrigated	Duty in Acre-Feet Per Acre
Capulin	31.37	Apr. 20	Aug. 1	90	30	5400	700	7.72
Head Overflow	49.8	Apr. 10	July 1	70	40	5600	59	95.0
Alamosa Spring Cr.	62.	May 1	Aug. 1	60	15	1800	1930	.93
Arroya	53.	May 1	Aug. 1	70	40	5600	1260	4.44
Union	40	May 1	July 20	70	40	5600	1266	4.42
N. Alamosa	49	May 1	July 1	70	40	5600	1000	5.60
Cottonwood	35.10	May 1	July 20	60	30	3600	1000	3.60
Overflow No. 4	40	May 1	Aug. 1	50	15	1500	500	3.0
Lower La Jara	44.8	May 1	July 30	40	30	2400	....	....
Norland Bros.	48	Apr. 25	July 20	50	45	4500	705	6.38
Flintham	25	May 1	Aug. 1	45	20	1800	400	4.5
Miller	60	May 1	July 25	40	40	3200	1510	2.12
Overflow No. 1	112	Apr. 20	July 1	80	60	9600	5030	1.91
Plano Vista	39	May 1	Aug. 1	60	20	2400	1570	1.53
Davis and Chapman	51	May 1	July 10	65	25	3250	1200	2.71
Scandinavian	43	May 1	July 1	65	10	1300	1200	1.08
Alamosa Creek	166	May 1	Aug. 1	60	14	1680	4210	.4

DIVISION NO. 3, DISTRICT NO. 21—Concluded.

Coddington	30	May	1	Aug.	1	70	15	2100	960	2.19
Rivera	28	May	1	July	1	45	15	1350	360	3.75
La Joya	27	Apr.	1	June	25	45	20	1800	585	3.08
DIVISION NO. 3, DISTRICT NO. 22										
Angustura	42.72	Apr.	1	June	20	81	....	....	320	....
Alamo	36.	Apr.	1	June	20	81	....	....	2000	....
Antonito	250	Apr.	1	June	20	81	....	....	2000	....
Canon	42.89	Apr.	1	Aug.	12	134	....	....	1700	....
Cottonwood	28.5	Apr.	1	June	12	73	....	....	720	....
El Coda	25.18	Apr.	1	Aug.	29	150	....	....	260	....
Ephraim	47.	Apr.	1	July	4	95	....	....	4000	....
Fuerticitous	31.47	Apr.	1	Aug.	18	140	....	....	400	....
Guadalupe Main	69.82	Apr.	1	Aug.	29	150	....	....	2560	....
Heads Mill & Irr. Co.	117 14	Apr.	1	Aug.	29	150	....	....	160	....
Jose B. Romero	25	Apr.	1	July	14	105	....	....	1000	....
J. M. Espinosa	26	Apr.	1	July	21	112	....	....	240	....
La del Rio	31.44	Apr.	1	Aug.	29	150	....	....	640	....
La Sauces	88.43	Apr.	1	Aug.	29	150	....	....	1600	....
Lobatos	27.58	Apr.	1	Aug.	1	91	....	....	160	....
Los Ojos No. 1	44.16	Apr.	1	June	26	87	....	....	160	....
Mesitos	38.99	Apr.	1	Aug.	19	144	....	....	2000	....
Manassa	73.6	Apr.	1	July	4	95	....	....	12000	....
Magote	342.4	Apr.	1	June	6	67	....	....	5000	....

DIVISION NO. 3, DISTRICT NO. 22—Concluded

NAME OF DITCH	Amount of Appropriation in Cu. Ft. Per Sec.	First Day Water Used	Last Day Water Used	Number of Days Water Carried from Natural Stream	Average Daily Amount of Water During Season	Number of Acre-Feet Used During Season	Number of Acres Irrigated	Duty in Acre-Feet Per Acre
Mogales Valley	26	Apr. 1	June 1	61			560	
Overflow*	34.71	Apr. 1	Aug. 22	144			160	
Seledonai Valdez	31.77	Apr. 1	Aug. 29	150			640	
San Jose	40.28	Apr. 1	Aug. 29	150			1600	
Santiago	55.59	Apr. 1	Aug. 22	144			500	
San Juan and San Rafael	47.76	Apr. 1	July 11	102			450	
Sanchez	27.26	Apr. 1	July 4	93			720	
Sanford	107.5	Apr. 1	July 4	95			4000	
Trujillo	29.8	Apr. 1	Aug. 29	150			300	
Taos Valley No. 1	500.	Apr. 1	June 20	81			3000	
Taos Valley No. 2	500	Apr. 1	June 20	81				
Richfield	56.24	Apr. 1	July 4	95			3000	
DIVISION NO. 3, DISTRICT NO. 24								
Cordillera	435	Water diverted through Culebra and Eastdale Canal						
San Luis Mill	27	Continual for power						
Eastdale-Culebra	25							
Culebra-Eastdale	723							
Sanchez	606							

DIVISION NO. 3, DISTRICT NO. 25								
Baca Grant	125	May 1	Sept. 30	150	70	21000	4435	4.84
Wale and Shellabarger	75	May 6	Oct. 5	150	10	3000	1930	1.56
DIVISION NO. 3, DISTRICT NO. 26								
Travis	25	May 6	July 6	61	2352		1250	
DIVISION NO. 5, DISTRICT NO. 38								
East Mesa	31.8	May		80	14		682	
Salvation	58.	May	Sept. 9	100	40		965	
Mt. Meadow	25.6	Mch.	July 12				150	
DIVISION NO. 5, DISTRICT NO. 39								
Rifle Creek Canon	28	May 8	Sept. 28	142			1019	
Grand Tunnel	26.5	May 8	Sept. 28	135			1086	
Grass Valley	100	May 8	Sept. 28	140			1457	
Cactus Valley	50	May 8	Sept. 10	125			663	
Ware and Hinds	26.2	May 8	Sept. 25	140			1284	
DIVISION NO. 4, DISTRICT NO. 40								
Minnesota	32.51	May 15	Oct. 1	130	20	5200	2200	2.36
Stewart	50.75	May 22	Oct. 10	135	50	13500	2700	5.0
Fire Mountain	50.	May 20	Oct. 5	130	80	20800	3150	6.61
Leroux	54.35	May 1	Sept. 16	139	19.6	5449	1159	4.7
DIVISION NO. 4, DISTRICT NO. 41								
Loutsenhizer	48	Mch. 15	Nov. 15	245	75	36750	4300	8.55
Montrose and Delta	200	Apr. 1	Oct. 15	198	250	100000	14500	6.9
Ironstone	37.5	Mch. 15	Nov. 15	245	50	24500	5800	4.23

DIVISION NO. 4, DISTRICT NO. 41—Concluded.

NAME OF DITCH	Amount of Appropriation in Cu. Ft. Per Sec.	First Day Water Used	Last Day Water Used	Number of Days Water Carried from Natural Stream	Average Daily Amount of Water During Season	Number of Acre-Feet Used During Season	Number of Acres Irrigated	Duty in Acre-Feet Per Acre
Garnett	45	Mch. 10	Nov. 15	200	30	15000	1800	8.32
Home Run	25	Apr. 1	Nov. 15	229	20	9660	1550	5.92
DIVISION NO. 4, DISTRICT NO. 42								
Brown and Campion	30.6	May 3	Oct. 4	154	3.93	1210	716	1.69
DIVISION NO. 1, DISTRICT NO. 46								
Eureka	70.	May 8	July 18	70	40	5600	2395	2.33
Mallon	37.5	Apr. 15	July 10	85	40	6800	1200	5.66
Wolfer	146	May 1	July 10	70	130	18200	11900	1.53
Staples No. 1	35	May 15	July 25	70	35	4900	1800	2.72
Mitchell	31.75	May 10	July 18	68	25	3400	700	4.85
Mutual	100	May 10	July 10	60	75	9000	4300	2.09
Victor	35	May 10	July 15	95	25	4500	890	5.05
Little Grizzley	25	May 18	July 20	62	25	3100	850	3.65
Damfino	25	May 15	July 15	60	12	1440	1400	1.03
Arapahoe	39	May 10	July 12	62	22	2728	1220	2.24
Big Grizzley	30	Apr. 25	July 16	81	30	4860	1280	3.78
Little Neilie	87	May 1	July 12	72	70	10080	4000	2.52
Chapman	27	May 1	July 15	75	20	3000	800	3.75
Roaring	38.25	May 20	July 20	60	30	3600	1000	3.6

DIVISION NO. 1, DISTRICT NO. 46—Concluded.

Pleasant Valley	36	May	5	July	15	70	45	6300	2500	2.52
Davis	35	May	10	July	10	60	35	4200	1500	2.80
Staples No. 2	104.4	May	11	July	15	64	40	5120	3200	1.60
Mallon No. 2	80	Apr.	15	July	10	85	70	11900	3200	3.72
Darby	69.5	May	12	July	20	68	50	6800	3200	2.12
Hanson	93.24	May	10	July	10	60	45	5400	7000	.77
Independent	33.75	May	5	July	15	70	28	3920	1660	2.36
Briggs and Bohn	36	May	12	July	20	68	24	3264	1200	2.72
DIVISION NO. 1, DISTRICT NO. 47										
Midland	202	May	21	July	12	52	62.33	6448	1380	4.67
Old S. C.	32.9	May	21	Nov.	30	193	24.3	9372	600	15.6
Lost Treasure	55.	May	10	July	20	71	35	4970	1000	4.97
Cleveland	38.5	May	15	Nov.	6	175	25.3	8866	1000	8.86
DIVISION NO. 1, DISTRICT NO. 48										
Yelton	30.14	May	16	July	20	66	12.9	1702	131	13.0
Timothy	34.36	June	15	Oct.	10	127	7.46	......	80	......
DIVISION NO. 4, DISTRICT NO. 60										
Gurley	62.5	May	10	......		......	......	......	6272	......
Lone Cone	32.	May	15	Aug.	20	98	......	......	4950	......
Colony	60	Mch.	28	Nov.	14	231	......	......	4365	......

DIVISION NO. 2, DISTRICT NO. 67

NAME OF DITCH	Amount of Appropriation in Cu. Ft. Per Sec.	First Day Water Used	Last Day Water Used	Number of Days Water Carried from Natural Stream	Average Daily Amount of Water During Season	Number of Acre-Feet Used During Season	Number of Acres Irrigated	Duty in Acre-Feet Per Acre
Colorado-Kansas	98.51	Nov. 16, 13	Nov. 15	232	48.	22272	4517	4.94
Amity	283.5	Nov. 16, 13	Nov. 14	257	267	137228	32794	4.18
Lamar	385.29	Nov. 16, 13	Nov. 15	263	77	40402	9459	4.28
Manvel	54.	Nov. 16, 13	Sept. 28	92	12	2208	250	8.86
X Y	69	Nov. 16, 13	Nov. 15	154	25	6700	2362	2.84
Graham	61	Apr. 20	Aug. 14	30	23	1380	1650	.84
Buffalo	67.5	June 15	Sept. 30	97	20	3880	1952	1.99

DIVISION NO. 1, DISTRICT NO. 1—1914

Name of Reservoir	Source of Supply	Capacity in Cubic Feet	Ditch Supplied from Reservoir	Quantity of Water in Reservoir, Cubic Feet	
				May 1st	Nov. 1st
Jackson Lake	So. Platte	1,543,991,407	Fort Morgan, Upper Platte and Beaver, Trowell	1,413,000,000	1,200,000,000
Empire	So. Platte	1,642,629,890	Bijou Irrig. Dist.	1,100,000,000	120,019,807
Moore No. 4	Muddy Cr.	46,000,000		35,000,000	0
Riverside	So. Platte	2,860,000,000	Tremont and others	2,048,000,000	348,069,108
Fort Morgan Land & Res. Co. No. 2	So. Platte	435,600,000		250,000,000	0
Point of Rocks	So. Platte	3,920,400,000			
Prewitt	So. Platte				
DIVISION NO. 1, DISTRICT NO. 2.					
Oasis and Barr	So. Platte, 1st, 2nd, 3rd Crs.	1,436,880,000	Neres, Burlington and others	1,436,880,000	34,920,000
Horse Creek	So. Platte	740,520,000		740,520,000	0
Prospect	So. Platte	243,946,000	Henrylyn	243,946,000	0
Sand Creek	So. Platte	78,408,000	Henrylyn	78,408,000	0
Higgins	So. Platte	4,900,500	Lateral	4,900,500	0
Lutz	So. Platte	2,380,200	Laterals	2,380,200	0
Magers	So. Platte	2,321,021	Laterals	2,321,021	0
Little Western	So. Platte	5,500,000	Laterals	5,500,000	0
H. A. Smith	So. Platte	4,530,240	Laterals	4,530,240	0

DIVISION NO. 1, DISTRICT NO. 2—Concluded.

Skeel No. 1	So. Platte	6,975,000	Laterals	6,975,000	0
Rutherford	So. Platte	1,787,500	Laterals	1,787,500	0
Geo. Smith	So. Platte	3,180,255	Laterals	3,180,255	0
Fulton Waste	So. Platte	22,895,225	Laterals	22,895,225	0
Lower Latham	So. Platte	270,700,000	Laterals	270,700,000	0
Z. J. Fort	So. Platte	7,168,200	Laterals	7,168,200	0
Milton	So. Platte	1,873,080,000	Gilmore	1.873,080,000	0
Carlin	So. Platte	2,962,080	Lateral	2,962,080	0
Dougan	So. Platte	9,583,200		9,583,200	0
Standley	Clear, Woman, Ralston, Leyden, Coal Crs.	2,178,000,000	Bull, Niver and O'Brian	435,600,000	0
Foster Nos. 1-2	So. Platte	5,227,200	Bowles	5,227,000	0
Kinear Nos 1-2	So. Platte	2,613,000	Bowles	2,613,000	0
Meek No. 1	So. Platte	2,613,600	Bowles	2,613,600	0
Meek No. 2	So. Platte	4,007,520	Bowles	4,007,520	0
Bowles No. 1	So. Platte	30,492,000	Bowles	30,492,000	0
Bowles No. 2	So. Platte	20,691,000	Bowles	20,691,000	0
Geneva	So. Platte	654,400	Bowles	654,400	0
Henry	So. Platte	1,089,000	Bowles	1,089,000	0
Mildred	So. Platte	19,295,200	Bowles	19,295,200	0
Curtis	So. Platte	784,080		784,080	0
East Line	So. Platte	3,267,000		3,267,000	0
Clark	So. Platte	2,744,000		2,744,000	0
Ferguson	So. Platte	871,200		871,200	0

DIVISION NO. 1, DISTRICT NO. 3

Name of Reservoir	Source of Supply	Capacity in Cubic Feet	Ditch Supplied from Reservoir	Quantity of Water in Reservoir, Cubic Feet	
				May 1st	Nov. 1st
Warren Lake	Cache la Poudre	96,000,000	Outlet	64,000,000	10,000,000
Windsor Lake	Cache la Poudre	78,408,000	Outlet	60,000,000	50,000,000
North Gray	Box Elder	12,000,000	Lake	12,000,000	9,000,000
South Gray	Box Elder	22,293,000	Lake	22,000,000	16,000,000
Reservoir No. 4	Cache la Poudre	43,370,000	Larimer County	26,000,000	0
Spring Canon	Spring Canon Cr.	2,683,000	Outlet	2,683,000	0
Reservoir No. 1	North Poudre	29,346,000	Outlet	29,000,000	19,000,000
Claymore	Cache la Poudre	39,000,000	Pleasant V. and Lake	39,000,000	26,000,000
Reservoir No. 1	Box Elder	24,830,000	Outlet	21,000,000	5,000,000
Richards	Cache la Poudre	46,000,000	Larimer Co.	46,000,000	13,000,000
Reservoir No. 2	Box Elder	8,500,000	Outlet	5,000,000	0
Reservoir No. 3	N. Poudre	125,000,000	Outlet	125,000,000	21,000,000
Caverly	N. Poudre	7,500,000	Outlet	7,000,000	0
Curtis	Cache la Poudre	34,000,000	Larimer Co.	34,000,000	0
Dixon Canon	Dixon Canon Cr.	19,500,000	Outlet	12,000,000	0
Reservoir No. 4	Box Elder	11,000,000	Outlet	6,000,000	0
Reservoir No. 3	Box Elder	34,500,000	Outlet	28,000,000	0
Stuchell	N. Poudre	3,056,000	Outlet	3,000,000	0
Jameson Lake	Box Elder	3,500,000	Outlet	0	0

DIVISION NO. 1, DISTRICT NO. 3—Continued.

Mitchell No. 1	Lone Pine	25,280,000	Water for sale	25,000,000	7,000,000
Mitchell No. 2	Lone Pine	4,370,000	Water for sale	4,000,000	0
Mitchell No. 3	Lone Pine	4,335,000	Water for sale	4,000,000	0
Reservoir No. 4	N. Poudre	46,766,000	Outlet	46,000,000	0
Reservoir No. 2	N. Poudre	169,000,000	Outlet	169,000,000	40,000,000
Larimer and Weld	Cache la Poudre	390,000,000	Larimer and Weld	360,000,000	200,000,000
Windsor	Cache la Poudre	810,000,000	Cache la Poudre	712,000,000	300,000,000
Reservoir No. 1	Cache la Poudre	206,000,000	Larimer Co	167,000,000	32,000,000
Long Pond	Cache la Poudre	176,000,000	Larimer Co	144,000,000	13,000,000
Lindenmeier	Cache la Poudre	40,000,000	Larimer Co	35,000,000	25,000,000
Cache la Poudre	Cache la Poudre	415,000,000	Cache la Poudre	400,000,000	190,000,000
Wood	Seepage and Flood	140,000,000	Outlet	75,000,000	30,000,000
Reservoir No. 5	Cache la Poudre	250,000,000	N. Poudre by Exch	250,000,000	0
Neece	Flood	4,257,000	Neece	3,000,000	0
Reservoir No. 1	Cooper and Ames Slough	35,000,000	Lake	31,000,000	0
Dandy and Twin	Lone Pine	26,856,000	Water for sale	22,000,000	13,000,000
Reservoir No. 6	Cache la Poudre	445,000,000	N. Poudre by Exch	420,000,000	445,000,000
Deer Lake	Lone Pine	3,842,000	Water for sale	3,000,000	0
Fossil Creek	Cache la Poudre	503,000,000	N. Poudre by Exch	496,000,000	160,000,000
Erie Lake	Lone Pine	3,000,000	Water for sale	2,000,000	0
Douglas	Cache la Poudre	460,000,000	Larimer and Weld	280,000,000	58,000,000
Coal Creek	Box Elder	178,400,000	Cactus Hill	153,000,000	82,000,000
Reservoir No. 3	Soldier Canon	31,000,000	Outlet	20,000,000	10,000,000

DIVISION NO. 1, DISTRICT NO. 3—Concluded.

Name of Reservoir	Source of Supply	Capacity in Cubic Feet	Ditch Supplied from Reservoir	Quantity of Water in Reservoir, Cubic Feet	
				May 1st	Nov. 1st
Big Beaver	Beaver Cr.	69,201,000	Water for sale	0	0
Reservoir No. 8	Cache la Poudre	400,000,000	Larimer and Weld	380,000,000	260,000,000
Cameron Pass	Joe Wright and Michigan	35,458,000	N. Poudre	0	0
Black Hollow	Cache la Poudre	250,000,000	Larimer Co.	58,000,000	11,000,000
Tenney	Cache la Poudre	15,000,000	Outlet	12,000,000	0
Reservoir No. 2	Cache la Poudre	6,000,000	Outlet	6,000,000	0
Bubble	Cache la Poudre	9,000,000	Outlet	8,000,000	5,000,000
Halligan	N. Poudre	280,000,000	N. Poudre	280,000,000	32,000,000
Reservoir No. 15	N. Poudre	240,000,000	N. Poudre	0	0
Sheep Creek	Sheep Cr.	20,000,000	Water for sale	7,000,000	7,000,000
Lake Agnes	Zimmerman Cr.	5,000,000	Water for sale	5,000,000	5,000,000
Elder	Cache la Poudre	100,000,000	Larimer and Weld	40,000,000	0
Portner	Fossil Cr.	26,000,000	N. Poudre	12,000,000	12,000,000
Chambers Lake	Cache la Poudre	290,000,000	W. S. and Storage Co.	155,000,000	64,000,000
Worster	Sand and Sheep Cr's.	132,421,000	Larimer and Weld	0	....
DIVISION NO. 1, DISTRICT NO. 4.					
Boyd Lake	Big Thompson	1,918,000,000	Exchange	1,000,000,000	992,000,000
Seven Lakes	Big Thompson	367,300,000	Loveland and Greeley	275,000,000	110,000,000

DIVISION NO. 1, DISTRICT NO. 4—Concluded.

Marianna	Big Thompson	180,000,000	Home Supply	180,000,000	45,000,000
Home Supply	Big Thompson	400,000,000	Home Supply	400,000,000	25,000,000
Lake Loveland	Big Thompson	625,000,000	Loveland and Greeley	625,000,000	147,397,178
Buckhorn	Buckhorn Cr.	51,816,431	Louden	35,000,000	10,000,000
Long Lake	Roaring Fork	33,088,000	Farmers		
Boulder and Larimer Co	Little Thompson	319,895,000	Boulder and Larimer Co.	319,895,000	77,812,000
Welch Nos. 3-4	Big Thompson	20,564,676	Handy	20,564,676	
Welch Nos. 1-2-5	Big Thompson	168,598,658	Handy	168,598,658	
Ryan Gulch	Big Thompson	31,796,870	Exch.	31,796,870	16,796,870
South Side	Big Thompson	15,225,639	So. Side	15,285,639	285,639
DIVISION NO. 1, DISTRICT NO. 5.					
Pleasant Valley	St. Vrain	110,300,055	Rough and Ready	70,054,400	20,000,000
Knoths Lake	St. Vrain	2,000,000	Hanson's	1,633,500	0
Highland No. 1	St. Vrain	125,071,248	Highland	33,889,104	0
Highland No. 2	St. Vrain	105,280,000	Highland	85,957,000	0
Highland No. 3	St. Vrain	71,023,000	Highland	71,855,680	0
Highland Lake	St. Vrain	24,452,500	Private	4,638,930	20,000
McIntosh	St. Vrain	107,153,830	Oligarchy		
Union	St. Vrain	850,000,000	Union (in Dist. 2)	850,000,000	600,000,000
Oligarchy	St. Vrain	76,816,437	Oligarchy		
Gold Lake	Left Hand Cr.	19,000,000	Left Hand	19,000,000	8,000,000
Crystal Lake	St. Vrain	1,033,000	Private	1,033,000	20,000

DIVISION NO. 1, DISTRICT NO. 5—Concluded.

Name of Reservoir	Source of Supply	Capacity in Cubic Feet	Ditch Supplied from Reservoir	Quantity of Water in Reservoir, Cubic Feet	
				May 1st	Nov. 1st
Clover Basin	St. Vrain	25,962,000	Clover Basin	25,962,000	20,000,000
Beaver Park	Beaver Cr.	122,976,000	Highland and Supply	100,000,000	0
Foothills	St. Vrain	184,629,820	Oligarchy and 7 others	74,491,200	0
DIVISION NO. 1, DISTRICT NO. 6.					
Marshall	So. Boulder	435,600,000	Community	435,600,000	174,240,000
West Lake	So. Boulder and Coal Cr's.	30,452,000	Community	30,452,000	400,000
Section 19	So. Boulder and Coal Cr's.	3,520,000		3,520,000	200,000
Section 17	So. Boulder and Coal Cr's.	1,520,000		1,475,812	50,000
Section 15	So. Boulder and Coal Cr's.	767,900		767,900	1,000
Section 35	So. Boulder and Coal Cr's.	2,500,100		2,500,100	25,000
Section 11	So. Boulder and Coal Cr's.	3,598,600		3,598,000	500,000
McKay Lake	So. Boulder and Coal Cr's.	41,678,208		40,678,208	650,000
Section 9	Coal Creek	927,000		927,000	2,500
Erie	So. Boulder	10,407,500	Town of Erie	6,000,000	4,000,000
Louisville	So. Boulder	12,664,764	Town of Louisville	3,500,000	3,000,000
Harper	So. Boulder	2,713,450	Harper's	715,450	0
Prince	So. Boulder	3,520,250	Prince's	2,000,000	500,000
Silver Lake	North Boulder	35,164,124	Town of Boulder	6,073,127	0

DIVISION NO. 1, DISTRICT NO. 6—Concluded.

Island Lake	North Boulder	16,196,629	Town of Boulder	16,196,626	25,000
Goose Lake	North Boulder	11,377,158		10,467,326	505,000
Panama No. 3	Boulder	196,000,000	Branch of White Rock	190,000,000	1,000,000
Panama No. 1	Boulder	304,920,000	Panama	300,020,000	219,612,000
Base Line	So. Boulder	130,680,000	Lower Boulder	130,680,000	79,453,440
Barker Meadow	Middle Boulder	479,160,000	Boulder Cr.	174,240,000	215,550,000
Smart	Coal Cr.	10,305,000	Community	10,305,000	350,000
Kinnear	Coal Cr.	40,982,478		40,982,478	898,000
Last Chance	Coal Cr.	1,983,200	Zang	1,983,200	500,000
Church Upper Lake	Coal Cr.	1,910,000	Church	1,900,000	5,000
Eggleston No. 4	Coal Cr.	1,015,000	Eggleston	1,015,000	4,500
Eggleston No. 6	Coal Cr.	8,000,000		8,000,000	20,000
Albion Lake	North Boulder	40,000,000	Town of Boulder	37,602,791	35,620,000
DIVISION NO. 1, DISTRICT NO. 7.					
Loch Lomond 1-2-3-4-5	Clear Cr.	24,567,840	Agricultural	25,567,840	
Tucker	Ralston Cr.	78,408,000		78,408,000	25,000,000
Long Lake	Ralston Cr.	34,848,000		34,848,000	34,848,000
Copeland Nos. 1-2	Clear Cr.	4,356,000		4,356,000	
Standley	Clear Cr.	1,742,400,000	In District 2	1,350,560,000	519,660,000
Broad 1-2 and Leyden	Clear Cr.	73,180,000		73,180,000	
Ward and Lake	Clear Cr.	63,631,400		63,631,400	
Lee and Hallack 1-2-3-4	Clear Cr.	11,158,200		11,158,200	

DIVISION NO. 1, DISTRICT NO. 7—Continued.

Name of Reservoir	Source of Supply	Capacity in Cubic Feet	Ditch Supplied from Reservoir	Quantity of Water in Reservoir, Cubic Feet	
				May 1st	Nov. 1st
East Lakes 1-2-3-4	Clear Cr.	52,272,000		52,272,000	
Hackberry and Shoup 1-2-3-4-5	Clear Cr.	15,463,700		15,463,700	
Lathrop 1-2-3	Clear Cr.	18,295,200		18,000,000	3,000,000
Calkins	Clear Cr.	16,988,400		16,000,000	2,000,000
Church 1-2-3, Williams and Henry	Clear Cr.	16,068,000		13,000,000	1,000,000
Burnett and Harrington 1-2	Clear Cr.	13,058,000		13,000,000	
Fry Vogel 1-2-3 and Hintz	Clear Cr.	15,246,000		15,000,000	
Hussy and Rankin	Clear Cr.	13,503,600		13,000,000	1,000,000
King and Wooley 1-2-3	Clear Cr.	23,958,000		23,000,000	2,000,000
Johnson and Poitz	Clear Cr.	8,276,400		8,276,000	1,000,000
Neresheimer	Clear Cr.	13,068,000		13,000,000	1,000,000
Wadley and Brown	Clear Cr.	22,215,600		22,000,000	2,000,000
Webster and Brown	Clear Cr.	20,908,800		20,500,000	1,000,000
Hallack and Smith	Clear Cr.	8,276,400		8,276,000	
Crokes 1-2-3-4	Clear Cr.	39,204,000		39,000,000	
Finnerty, Brower and Brown	Clear Cr.	11,761,200		11,500,000	1,000,000
Richardson and Smith	Clear Cr.	20,928,800		20,928,800	1,000,000
Westminster	Clear Cr.	70,779,000		70,779,000	
Groves and Dollison	Clear Cr.	18,800,000		18,800,000	

DIVISION NO. 1, DISTRICT NO. 7—Concluded.

Legault 1-2 and Gay	Clear Cr.	23,000,000		23,000,000	
Wilbur and School	Clear Cr.	28,000,000		28,000,000	
Church	Clear Cr.	20,000,000		20,000,000	
DIVISION NO. 1, DISTRICT NO. 8.					
Castlewood	Cherry Cr.	250,000,000	Arapahoe	250,000,000	108,900,000
Clark	Happy Canon	108,900,000	Arapahoe	108,900,000	21,780,000
22 and 16	Cherry and Wild Cat Crs.	65,340,000	Arapahoe	65,340,000	21,780,000
DIVISION NO. 1, DISTRICT NO. 9.					
Soda Lake No. 1	Bear Cr.	10,500,000	Arnett	3,200,000	7,668,600
Soda Lake No. 2	Bear Cr.	76,860,000	Arnett	52,506,400	15,922,160
Harriman	Bear Cr.	38,000,000	Johnsons	34,689,440	35,389,440
Stickford	Bear Cr.	1,000,000	Rucker	475,000	724,400
Henry	Bear Cr.	6,600,000	Henry	6,600,000	5,467,440
Henry Lake	Bear Cr.	8,700,000	Henry Lake	6,619,220	1,500,000
Fort Logan	Bear Cr.	348,480	Logan	217,800	217,800
Rucker	Bear Cr.	1,100,000	Rucker	686,600	824,000
Johnson	Bear Cr.	11,200,000	Dutch Creek	11,200,000	8,425,500
Grant No. 1	Bear Cr.	4,900,000	Grant	4,900,000	4,228,800
Grant No. 2	Bear Cr.	3,200,000	Grant	3,200,000	3,000,000
Grant No. 3	Bear Cr.	3,000,000	Arnett	3,000,000	2,431,840
N. B. Coy No. 1	Bear Cr.	1,100,000	Coy	1,000,000	100,000

DIVISION NO. 1, DISTRICT NO. 9—Continued.

Name of Reservoir	Source of Supply	Capacity in Cubic Feet	Ditch Supplied from Reservoir	Quantity of Water in Reservoir, Cubic Feet	
				May 1st	Nov. 1st
N. B. Coy No. 2	Bear Cr.	300,000	Coy	300,000	200,000
Bowles No. 1	Bear Cr.	76,000,000	Bowles	75,242,056	64,630,775
Bowles No. 2	Seepage and Waste	15,681,600		15,681,600	11,761,200
Bowles No. 3	Bear Cr.	2,613,600	Bowles	2,613,600	1,742,400
Bowles No. 4	Bear Cr.	2,395,800	Bowles	2,395,800	1,950,700
Marston	Bear Cr.	853,200,000	Filter	834,846,440	753,948,540
Bergen No. 1	Turkey Cr.	16,345,300	Bergen	16,345,300	1,651,400
Bergen No. 2	Turkey Cr.	34,781,500	Bergen	34,781,500	750,000
Brooks	Turkey Cr.	435,600	Brooks	435,600	100,600
Dean	Turkey Cr.	17,424,000	Dean	17,424,000	200,000
Grant No. 1	Turkey Cr.	4,356,000	Grant	4,356,000	3,500,000
Grant No. 2	Turkey Cr.	522,720	Grant	522,720	450,000
Shearer	Turkey Cr.	4,356,000	Shearer	4,356,000	400,000
No. 7	Turkey Cr.	784,080	No. 7	784,080	100,000
Shepherd	Turkey Cr.	2,439,360	Shepherd	2,439,360	0
Gulch	Turkey Cr.	4,201,252	Gulch	4,201,000	0
Kendrick	Bear Cr.	5,227,220	Kendrick	871,220	150,000
Ward and Kendrick	Bear Cr.	17,424,000	Ward and Kendrick	17,424,000	12,197,200
Smith	Bear Cr.	15,424,000	Greene	8,185,920	6,176,400

DIVISION NO. 1, DISTRICT NO. 9—Concluded.

Porter	Bear Cr.	522,720	Porter	300,000	375,000
Deutcher and Reynolds	Bear Cr.	3,267,000	Deutcher	3,000,000	1,250,000
Rollins No. 1	Bear Cr.	3,484,800	Rollins	1,742,400	1,150,000
Rollins No. 2	Bear Cr.	653,400	Rollins	653,400	0
DIVISION NO. 2, DISTRICT NO. 10.					
Charter Oak	Rock and Little Fountain	26,136,000		16,423,000	14,216,000
Clover Irr. Co.	Fountain	17,424,000		17,424,000	8,712,000
Stratton Estate No. 1	Cheyenne	6,534,000		6,534,000	3,267,000
Stratton Estate No. 2	Cheyenne	3,484,800		3,484,800	1,742,400
Stratton Estate No. 3	Fountain	13,547,160		13,547,100	6,773,580
Torbit	Rock Creek	3,049,200		3,049,200	811,200
(*)	Rock Creek	3,949,800		471,200	653,400
Calhan	Fountain Creek				3,949,800
DIVISION NO. 2, DISTRICT NO. 11.					
Evans Gulch	Evans Gulch	1,439,000	Stevens and Leiter	1,000,000	1,000,000
Big Evans Gulch No. 2	Evans Gulch	2,000,000	Stevens and Leiter	2,000,000	2,000,000
Mountain Lake	Springs and Seepage	5,000,000	Starr	5,000,000	5,000,000
Boss Lake	Springs and Seepage	26,832,000	So. Arkansas River	26,000,000	0
Sugar Loaf	Lake Fork Arkansas	828,306,931	Arkansas River	577,257,000	523,809,000
Clear Creek	Clear Creek	409,537,600	Otero	203,386,170	287,160,820
Twin Lakes	Lake Creek	2,377,851,480	Bob Creek		2,138,534,640

DIVISION NO. 2, DISTRICT NO. 12.

Name of Reservoir	Source of Supply	Capacity in Cubic Feet	Ditch Supplied from Reservoir	Quantity of Water in Reservoir, Cubic Feet	
				May 1st	Nov. 1st
Schaeffer	Beaver Cr.	137,151,000		132,828,000	0
Skagway	Beaver Cr.	144,000,000			130,000,000
Victor No. 2	E. Br. W. Beaver Cr.	9,105,000		8,000,000	8,933,000
Bison	E. Br. W. Beaver Cr.	45,000,000			44,666,000
Colorado Springs No. 7	Beaver Cr.	6,600,000			4,333,000
Colorado Springs No. 8	Beaver Cr.	26,000,000			25,060,000
Colorado Springs No. 2	Beaver Cr.	24,000,000			24,000,000
Colorado Springs No. 4	Beaver Cr.	115,000,000			86,933,000
Colorado Springs No. 5	Beaver Cr.	86,000,000			84,000,000
Lake Moraine	Beaver Cr.	40,000,000			33,200,000
Gillette	S. Fork Oil Cr.	500,000			500,000
Cripple Creek Nos 1-2	W. Fk. Beaver Cr.	23,200,000			23,200,000
Mt. Pisgah	Fourmile Cr.	138,000,000	Park Center		12,625,000
DIVISION NO. 2 DISTRICT NO. 13.					
Thomas Balman Lake Creek	Lake Cr.	2,592,000	Price	2,592,000	0
DIVISION NO. 2, DISTRICT NO. 14.					
Lake Henry	Arkansas R.	117,742,680	Sugar City	117,742,680	
Lake Meredith	Arkansas R.	678,359,880	Exch.	479,160,000	259,008,000

DIVISION NO. 2, DISTRICT NO. 14—Concluded.

Greenview	Fountain	2,613,600			
Pueblo W. Co. No. 1	Arkansas R.	679,000			
Pueblo W. Co. No. 2	Arkansas R.	767,180			
Pueblo W. Co. No. 3	Arkansas R.	955,441			
Pueblo W. Works No. 1	Arkansas R.	1,740,000			
Pueblo W. Works No. 2	Arkansas R.	1,760,000			
Teller	Turkey Cr.	580,654,800	Teller	261,360,000	217,800,000
DIVISION NO. 2, DISTRICT NO. 15.					
Chase					
Minnequa	Seepage	60,000,000	C. F. & I.	44,931,000	49,465,000
Bonnie Meade	Greenhorn Cr.				
Savard No. 2	Arkansas R.	119,000,000	C. F. & I.	58,686,000	105,987,000
Corwin or No. 2	Arkansas R.	141,000,000	C. F. & I.	134,234,000	139,221,000
Hayden	Greenhorn Cr.				
DIVISION NO. 2, DISTRICT NO. 16.					
Cucharas No. 5	Cucharas R.	1,807,740,000	Orlando No. 5	124,799,400	217,800,000
Bradford Lake	Huerfano R.	1,843,459,200	Orlando No. 5	None available	401,623,200
Maria	Cucharas R.	10,354,200			
C. T. Richie	Cucharas R.	1,200,000			
Robinson	Muddy	2,500,000			
Hayes	Cucharas R.	1,448,400			
Montes	Huerfano R.	251,000	Montes	257,000	100,000

DIVISION NO. 2, DISTRICT NO. 16—Concluded.

Name of Reservoir	Source of Supply	Capacity in Cubic Feet	Ditch Supplied from Reservoir	Quantity of Water in Reservoir, Cubic Feet	
				May 1st	Nov. 1st
Huerfano Valley	Huerfano R.	87,855,600		87,855,000	57,000,000
La Joya	Cucharas R.	7,741,400			
Stevens	Bear Cr.	91,150			
Pope Bros.	Huerfano R.	4,029,038			
McMillan	Huerfano R.	1,045,000			
Sharps Orchard	Cucharas R.	3,696,000			
Ellis	Huerfano R.	450,000			
McDonald	Cucharas R.	91,150			
Archuleta	Huerfano R.	569,400			
Holita	Cucharas R.	23,524,020		22,522,900	3,000,000
Dixon	Huerfano R.				
Homestead	Huerfano R.			Full	
Lake Oehm	Cucharas R.	171,543,950	Mo. Valley and Gomes	126,367,400	57,823,150
Willis Lake	Cucharas R.				
Walsenburg	Cucharas R.	17,933,950		15,000,000	0
Apache	Apache Cr.			217,800	3,922,200
Valdes	Santa Clara R.	50,946,205			
Goose Lake	Huerfano R.				

DIVISION NO. 2, DISTRICT NO. 17.

Lake No. 1	Arkansas R.	326,700,000	Lake (Holbrook)	326,700,000	174,240,000
Dye	Arkansas R.	196,020,000	Lake (Holbrook)	196,020,000	152,460,000
Horse Creek	Arkansas and Horse Cr.	1,171,163,000	Fort Lyon	392,040,000	435,600,000
Adobe Cr.	Arkansas and Adobe Cr.	4,094,640,000	Fort Lyon	217,800,000	1,711,720,000
Timpas No. 2	Timpas Cr.	128,585,000	Lateral No. 1		43,560,000
Timpas No. 3	Timpas Cr.	79,725,000	Lateral No. 2		34,848,000
Red Top	Mustang Cr.	26,136,000	Red Top		13,068,000
Hardesty	Mustang Cr.	6,846,000			
Brown (Mustang)	Mustang Cr.	144,000,000			
Swink No. 1	Apisbapa	1,798,156,800	Lateral No. 1		78,408,000
Swink No. 2	Apishapa	94,525,200	Lateral No. 2		4,356,000
Swink No. 5	Apishapa	304,920,000	Lateral No. 5		30,492,000
Thurston	Arkansas R.	304,920,000	Fort Lyon		30,492,000
Box Springs	Horse Cr.	162,000,000	Box Springs		13,068,000
DIVISION NO. 2, DISTRICT NO. 19.					
Model	Las Animas	886,883,220	Outlet	412,234,604	229,600,962
North Lake	Las Animas	44,000,000	Trinidad Pipe L.	38,000,000	36,000,000
Monument	Las Animas	7,000,000	Trinidad Pipe L.	7,000,000	7,000,000
Madrid No. 1	Las Animas	1,334,000	Trinidad Pipe L.	1,334,000	1,334,000
Madrid No. 2	Las Animas	1,334,000	Trinidad Pipe L.	1,334,000	1,334,000
Madrid No. 3	Las Animas	8,000,000	Trinidad Pipe L.	6,000,000	5,000,000
Jansen	Las Animas	800.000	Trinidad Pipe L.	800,000	700 000

DIVISION NO. 2, DISTRICT NO. 19—Concluded.

Name of Reservoir	Source of Supply	Capacity in Cubic Feet	Ditch Supplied from Reservoir	Quantity of Water in Reservoir. Cubic Feet	
				May 1st	Nov. 1st
Maple Street	Las Animas	170,000	Trinidad Pipe L.	100,000	100,000
Russell	Middle Fk. Whiskey Cr.	13,590,000	Russell and Stors	12,000,000	10,000,000
DIVISION NO. 3, DISTRICT NO. 22.					
Cove Lake	San Antonio and Conejos	250,000,000	North and South Laterals	100,000,000	0
DIVISION NO. 3, DISTRICT NO. 24					
Sanchez	Culebra River	4,493.454,605	Culebra-Eastdale	274,088,000	711,319,000
Eastdale No. 1	Culebra and Costilla R.	150,975,000	Laterals 5 and 6	28,925,000	30,000,000
Eastdale No. 2	Culebra and Costilla R.	132,468,000	Lateral 4	65,340,000	37,000,000
Mesita	Culebra River	113,531,887	Laterals 7 and 8	8,700,000	15,350,000
Salazar	Rito Seco	5,341,151	Outlet	5,000,000	1,000,000
DIVISION NO. 4 DISTRICT NO. 34.					
Bauer Lake No. 2	Crystal and Chicken Cr.	60,000,000		50,000,000	20,000,000
Rentz	Lost Canon	174,240,000	Jones Lateral	142,460,000	20,000,000
Webber	Middle Mancos	15,000,000	Webber	12,000,000	1,000,000

DIVISION NO. 4, DISTRICT NO. 40

Calumet	Surface Creek	777,600		777,600	0
Chipmunk	Surface Creek	2,462,400		2,462,400	0
Cole	Surface Creek	3,369,600		3,369,600	0
Greenback	Surface Creek	1,598,400		1,598,400	0
Little Giant	Surface Creek	1,728,000		1,728,000	0
Hale	Beaver Cr.	2,073,600		2,073,600	0
Last Chance	Beaver Cr.	432,000		432,000	0
Leon Lake	Drainage	79,142,400		79,142,400	39,571.200
Trickle	Beaver	1,728,000		1,728,000	0
Y. & S.	Drainage	6,393,600		6,393,000	0
Zig Zag	Beaver Cr.	518,400		518,400	0
Trickle Park	Surface Cr.	136,907,200		136,907,200	0
Trout Lake	Surface Cr.	4,406,400		4,406,400	0
Upper Twin	Surface Cr.	5,184,000		5,184,000	0
Lower Twin	Surface Cr.	3,628,800		3,628,800	0
Cedar Mesa	Surface Cr.	16,416,000		16,416,000	0
Cabin Lake	Surface Cr.	2,073,600		2,073,600	0
Blanch	Surface Cr	1,728,000		1,728,000	0
Bonita	Surface Cr.	13,392,000		13,392,000	0
Weir & Johnson	Surface Cr.	25,920,000		25,920,000	0
Weir Park	Surface Cr.	1,728,000		1,728,000	0
Dryfus	Surface Cr.	2,764,800		2,764,800	0
Kehemeir	Surface Cr.	5,722,400		5,722,400	0

DIVISION NO. 4, DISTRICT NO. 40—Continued.

Name of Reservoir	Source of Supply	Capacity in Cubic Feet	Ditch Supplied from Reservoir	Quantity of Water in Reservoir, Cubic Feet	
				May 1st	Nov. 1st
Deserted Park	Surface Cr.	2,073,600		2,073,600	0
Sackett	Surface Cr.	4,320,000		4,320,000	0
Military	Surface Cr.	4,320,000		4,320,000	0
Vella	Surface Cr.	5,356,800		5,356,800	0
Round Lake	Surface Cr.	1,468,800		1,468,800	0
Greenwood	Surface Cr.	1,728,000		1,728,000	0
Little Pointer	Surface Cr.	1,728,000		1,728,000	0
Patterson No. 2	Leroux Cr.	2,073,600	Patterson	2,073,600	0
Hobson	Leroux Cr.	479,160	Leroux No. 4	479,160	0
Crater	Leroux Cr.	6,393,600	Stull	6,393,600	0
Holy Terror	Leroux Cr.	5,443,200	Leroux No. 4	5,443,200	0
Patterson No. 3	Leroux Cr.	648,000	Leroux No. 4	648,000	0
Skimmilk	Leroux Cr.	518,400	Leroux No. 4	518,400	0
Dog Fish	Leroux Cr.	6,998,400	Leroux No. 4	6,998,400	0
Bailey Extension	Leroux Cr.	16,588,800	Leroux No. 4	16,588,800	0
Brockman No. 2	Leroux Cr.	518,400	Allen Mesa	518,400	0
Brockman No. 1	Leroux Cr.	1,209,600	Leroux No. 4	1,209,600	0
Fisher	Leroux Cr.	259,200	Allen Mesa	259,200	0
Green Mountain	Leroux Cr.	259,200	Highline	259,200	0

DIVISION NO. 4, DISTRICT NO. 40—Continued.

Blide	Leroux Cr.	1,036,800	Leroux No. 4	1,036,800	0
Barrow	Leroux Cr.	432,000	Allen Mesa	432,000	0
Miller	Leroux Cr.	1,555,200	Ellington	1,555,200	0
Dowdy	Leroux Cr.	3,628,800	Leroux No. 4	3,628,800	0
Lost Hunter	Leroux Cr.	345,600	Leroux No. 4	345,600	0
Ellington	Leroux Cr.	864,000	Allen Mesa	864,000	0
Skookum	Surface Cr.	691,200		691,200	0
McClellan	Surface Cr.	4,406,400		4,406,400	0
Trio	Surface Cr.	1,814,400		1,814,400	0
Stell No. 2	Surface Cr.	257,200		257,200	0
Little Jonah	Beaver Cr.	345,600		345,600	0
Sissey	Beaver Cr.	345,600		345,600	0
Boyd, Alexander, Matt Arch, Deep Slough, Island, Rim Rock, Sheep Slough, Big Eggleston, Little Eggleston, Twin, Forest, Kennicott, Kiser, Donnelly, Barren, Ward	Ward and Kiser Cr's.	345,600,000		345,600,000	99,104,000
Carbonate	Youngs Cr.	648,000		648,000	0
Finney Lake	Kiser Cr.	3,110,400		3,110,400	0
Kiser	Kiser Cr.	1,296,000		1,296,000	0
Lily Pad	Kiser Cr.	1,252,800		1,252,800	0
Little Gem	Kiser Cr.	3,888,000		3,888,000	0
Young's Cr No. 1-2-3	Youngs Cr.	12,830,400		12,830,000	0
Musk Rat	Kiser Cr.	691,200	Surface Cr.	691,200	0

DIVISION NO. 4, DISTRICT NO. 40—Concluded.

Name of Reservoir	Source of Supply	Capacity in Cubic Feet	Ditch Supplied from Reservoir	Quantity of Water in Reservoir, Cubic Feet	
				May 1st	Nov. 1st
McCoon	Kiser Cr.	1,468,800	Surface Creek	1,468,800	0
Noles Slough	Kiser Cr.	2,073,600	Surface Cr.	2,073,600	0
Pine	Kiser Cr.	345,600	Surface Cr.	345,600	0
Pedro	Kiser Cr.	2,721,600	Surface Cr.	2,721,600	0
Prebel	Youngs Cr.	4,600,800	Surface Cr.	4,600,800	0
Rock Lake	Kiser Cr.	1,339,200	Surface Cr.	1,339,200	0
Wayman	Kiser Cr.	1,036,800	Surface Cr.	1,036,800	0
Womack No. 1, Womack No. 2	Kiser Cr.	3,888,864	Settle	3,888,864	0
Basin No. 1	George Cr.	4,432,000	Doctors	4,432,000	0
Basin No. 2	George Cr.	2,160,000		2,160,000	0
Granby Nos. 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12	George Cr.	45,360,000	Granby	45,360,000	0
Fruitgrowers	Alfalfa Run	259,250,000	Butte-Fogg	259,200,000	86,400,000
Monument	Minnesota Cr.	72,250,000	Minnesota	72,250,000	0
Overland	Cow. Cr.	250,470,000	Overland	250,470,000	0
Fruitland	Crystal Cr.	140,948,000	Fruitland	140,948,000	0
Big Battlement	George Cr.	8,121,600	Cedar Park West	8,121,600	0
Little Battlement	George Cr.	6,220,800	Cedar Park West	6,220,800	0
Gray	Leroux Cr.	5,749,920	Gray	5,749,920	0
Lucky Find	Leroux Cr.	1 728,000	Leroux No. 4	1,728,000	0

DIVISION NO. 4, DISTRICT NO. 42

Bonham, Atkinson, Lake Nos. 1-2-4	Snow and Springs	132,835,348	Kiggins and Goyn, Koakley and Kiggins, Johnson and Stewart, Akins, Last Chance	0	0
Anderson and Libby	Snow and Springs	12,534,826	Grove Creek No. 1	0	0
Lake No. 1, Water Dog No. 4, Fish Lake No. 3, Summit Nos. 1-2	Snow and Springs	42,042,370	Koakley and Kiggins, Mesa Cr., West Side Independent, Arkansas, Bower, Sunset, King, Miller, Beizer and Davis	0	0
Grand Mesa Nos. 1-6-8-9	Snow and Springs	83,670,899	Juniata, Highline, Brown and Campion, Smith Irr., Bowen, Barry, Sullivan, Williams and Washburn and Downing	0	0
Chambers	Snow and Springs	11,936,311	Juniata, Kannah Cr. H. L.	0	0
Elk Glen	Snow and Springs	7,800,912	Juniata, Northwestern	0	0
Lake Nos. 1-2-4-5, Meadow Lake Nos. 1-2, Blackman Lake, Jensen Lake	Snow and Springs	53,013,996	Snipes, Hall, Mill, Kirkendall, Wolfe, Shotwell, Davenport, Miller, Duffy, Mormon, Mesa Enl., Parker Basin, Park View	0	0
Coon Creek Nos. 1-2-3	Snow and Springs	16,884,292	Ellsbury, Barnes, Wagner, Whitney, Atwell, Craig, Allen	0	0
Bull Creek Nos. 1, 2, 3, 4, 5	Snow and Springs	18,961,668	Bull Creek, Riser, Pioneer Plateau	0	0
DIVISION NO. 5, DISTRICT NO. 45					
Battlement Reservoirs 1, 2, 3, 4, 5, 6, 7	Battlement Cr.	57,775,806	Battlement, DeWitt, Doby, R. F., Huntley, Shutt, O'Toole, Good, Cedar Grove, Musconetong	57,775,806	0

DIVISION NO. 1 DISTRICT NO. 48

Name of Reservoir	Source of Supply	Capacity in Cubic Feet	Ditch Supplied from Reservoir	Quantity of Water in Reservoir, Cubic Feet	
				May 1st	Nov. 1st
Laramie Lake	Laramie River	5,000,000	Chambers Lake	5,000,000	0
Lost Lake	Laramie River	12,000,000	Chambers Lake	10,000,000	0
Porter Lake	Porter Creek	10,140,425	Brown	0	0
Johnson	Grace Creek	6,500,000		5,000,000	3,000,000
Weir	Jimmie Creek	2,947,628		0	0
DIVISION NO. 5 DISTRICT NO. 58.					
Gardner Park	Snow and Springs	47,916,000	Stillwater	47,916,000	
Wheeler	Lake Creek	1,600,000	Wheeler No. 3		
Chambers	Snow	4,221,000	Chambers	4,221,000	
Allin	Trull Creek	6,503,865		6,503,805	
Hart Lake	Watson Cr.	12,000,000	Watson Creek	12,000,000	
DIVISION NO. 4. DISTRICT NO. 60.					
Gurley	Beaver Creek	28,090,000	Gurley	0	0
Lone Cone	Naturita and Brewster	84,000,000	Lone Cone	45,000,000	50,000,000
DIVISION NO. 4, DISTRICT NO. 61.					
Buckeye	Deep, Taylor, Geyser Creeks		Ray, Midland, Highline	87,120,000	52,272,000

DIVISION NO. 1, DISTRICT NO. 64.

Jumbo	So. Platte	1,227,445,000	Highline, Peterson, Settlers	987,000,000	862,000,000
Prewitt	So. Platte	1,429,831,368	Pawnee, Schneider, etc.	914,716,000	435,600,000
Point of Rocks	So. Platte	3,543,110,030	Outlet	1,219,680,000	174,290,000
DIVISION NO. 1, DISTRICT NO. 65.					
Rosenkrans	Willow Cr.	20,000,000	Rosenkrans	10,000,000	15,000,000
Olive Creek	Olive Cr.	2,000,000	Olive Cr.	1,500,000	2,000,000
Holy Joe	Holy Joe Cr.	1,000,000	Holy Joe	1,000,000	1,000,000
DIVISION NO. 2, DISTRICT NO. 67.					
Two Buttes	Two Buttes Cr.	1,960,200,000	Main Canal	1,132,560,000	1,350,360,000
Great Plains	Arkansas		Amity		1,921,605,840
DIVISION NO. 5, DISTRICT NO. 70.					
McDowell	Roan Creek	348,480	Outlet	348,480	348,480
Glen Beulah No. 1	Clear Creek	348,480	Newton	0	0
Blair and McDowell	Floodwater				
Meyers	Roan Creek	174,240	Roan Creek	174,240	174,240
Conwell	Con Creek	218.800	Conwell	43,560	43,560

CHAPTER VI

CAREY ACT PROJECTS

There is in the State of Colorado one completed and successful Carey Act project which deserves special mention for the fact that it is the first one to be completed and there is quoted herein a recent report from the Manager of the project which sets forth concisely, but in some detail, the main facts concerning the project, namely the Two Buttes Project.

The reservoir has a capacity of over 40,000 acre feet, and the area which will be irrigated is nominally 23,000, but actually about 20,000 acres of first class irrigable land.

The main canal has a capacity of 225 cubic feet per second:

Lateral No. 1	60 cubic feet
Branch A	70 cubic feet
Lateral No. 2	125 cubic feet
Branch B	120 cubic feet
Branch C	50 cubic feet

The works are very well constructed and permanent in character. The dam is of earth, well riprapped and well constructed. Rating flumes have been established along the line of the main canal and a good system of control in the use of the water has been established. The most cordial relations exist between the water users and the construction company; indeed, the construction company on account of a very short supply of water since completion of the project, have remitted the interest payments until the present year.

The charge for water is $35 per acre. The construction company, through its agencies, has established a bank, stores and built a small town on the project, and it now proposes to purchase high grade live stock and to advance money for the development of the project.

The records of this office show that in 1912 something over 15,000 acre feet were stored. In 1913 only a little over 3,000 acre feet, but during 1914, as shown by the report of the Manager, the supply was some 50,000 acre feet, of which 40,000 acre feet are available, and that there remains a sufficient amount of water for next year's crops. The principal difficulty encountered by the projectors was that immediately after the completion of the dam, there was a series of some four years when the precipitation averaged nearly six inches below normal; indeed, 1914 is the first year of normal, or above normal, precipitation since the work on the project was completed.

In another chapter is given a discussion of run-off from watersheds in the plains region, and those interested in the details of this project or others similarly located, are referred to that chapter.

One Carey Act project has been cancelled in the last two years, and others have been allowed to lapse. Those remaining are thought to have merit, especially ones covering comparatively small areas. Little actual construction work has been done on these Carey Act projects, and it will probably be some time before any great amount of work is done. Probably not until after better business and credit conditions obtain and until after the European War is over. In the meantime, this office proposes to make further investigations on its own initiative and to take an active interest in the development of the projects, even though the state may let contracts to other parties for construction and development, and may not itself furnish the money necessary for construction.

Chicago, December 29, 1914.

Hon. John E. Field,
State Engineer, Capitol Building,
Denver, Colorado.

Dear Sir: In response to your inquiry relative to the Two Buttes Project, known officially as Colorado Segregation List No. 7, being the seventh segregation under the Carey Act secured by the State of Colorado, we desire to report as follows:

The petition for the segregation was filed with the State Board of Land Commissioners, December 8, 1908. This petition was favorably acted upon by the Board, and on April 9, 1909, a contract between the State and the Department of the Interior was executed and the lands segregated. A formal contract between the State Board of Land Commissioners and the Two Buttes Irrigation and Reservoir Company was executed June 12, 1909. Construction work by the latter company was commenced shortly thereafter, and by December 1, 1910, the entire irrigation system was completed, with the exception of the facing of the dam, which was postponed for a year but was finished in January, 1913. In February, 1913, final examinations were made of the system by the State Engineer, the State Board of Land Commissioners and representatives of the water users, and approved in all its details, such approval being formally noted on the records of the State Board of Land Commissioners.

In June, 1914, the Register of the State Land Board notified all entrymen on the Carey Act lands that actual residence upon the land embraced in their respective entries must begin not later than July 1, 1915, and that such residence must be continuous thereafter until final proof is tendered. The State Board of Land Commissioners has made application to the United States Department of the Interior for a patent for certain of the lands amounting to about 8,000 acres, such lands having been cultivated, irrigated and reclaimed in accordance with the terms of the Carey Act; and we understand that a patent will be issued by the department to the State in due course, and then the State will be able to issue deeds to the various entrymen who have tendered final proof. Final proof has been tendered by entrymen on about 3,000 acres to this date, and these proofs are being handed in from time to time.

The year 1914 has been a very prosperous one for the entrymen on this segregation. Crops of all kinds were excellent and no serious damage was caused by any of the natural agencies. All crops matured and were harvested without injury by frost. The principal crops were alfalfa, wheat, corn, oats, spelt, barley, maize, cane, caffir, feterita; the relative importance and quantity being in the order mentioned. Besides these, there were many minor crops produced as well for practical purposes as a demonstration of the agricultural range. Water was run in the canals a total of 39 days.

Rainfall in the region was slightly above normal, but the best and most advantageous feature about it was its timeliness; in fact, except in the case of alfalfa, just as good crops were produced without irrigation as with it. The following is a record of rainfall for the year 1914 at two stations—one at the town of Two Buttes, and the other at the dam. We give this with some remarks in order to show its bearing upon the run-off of the Two Buttes water shed. We have another station thirty miles above the dam, but the record is not reliable for one reason or another, and the results are not given.

Month	TWO BUTTES STATION		RESERVOIR STATION	
Jan..	Precipitation, all in form of snow	.05	Only a trace of precipitation for this month from snow	0.00
Feb.	Precipitation, form of snow	.30	Precipitation, form of snow	0.22
Mar.	Precipitation, form of snow	.12	Precipitation, snow	.07
Apr.	Precipitation, all in form of rain. A storm 29th and 30th .75 in rain. Slow rain. General	2.00	Precipitation, heaviest storm 29th and 30th. 1.25 in. in 2 days. On 30th 1.05 in. fell during day of 24 hours	2.13
May	Precipitation for month heaviest storm May 1st. 2.99 in. fell in 24 hrs. On 19th rain of 2.00 in. which fell in 2 hrs. On 28th rain of 0.91 in. 6 hrs. duration	6.08	Precipitation. Heaviest storm on 1st. 2.79 in. Duration 14 hrs. On 28th rain of 1.53 in. 10 hrs. duration	4.80
June	Precipitation, rainfall between 12th and 16th with exception of one rain, 20th, .09 in.	2.50	Rainfall Heaviest rain 2.57 in. Duration 24 hrs. Only one other rain of .06 during month.	2.63
July	Rainfall Beginning with 14th there were a series of storms until and including 19th, precipitation 1.92 in. for the 6 days. Heaviest storm being on 18th, 0.66 in. Duration 6 hrs.	3.17	Rainfall A series of storms 17th to 19th 2.41 in. fell in 3 days. Heaviest storm 18th, 1.35 in. From 20th to 23rd, 0.58 in. water fell.	3.36

Month	TWO BUTTES STATION		RESERVOIR STATION	
Aug.	Rainfall Heaviest storm was .62 in. 4th about 2 hrs. duration. There were four storms of comparatively light precipitation.	1.06	Rainfall Heaviest rain 1st and 3rd .24 in. and .23 in. S. W. winds all month.	0.73
Sept.	Precipitation Two storms of .11 in. Several hours duration.	0.47	Rainfall Heaviest .16 on 23rd.	0.43
Oct.	Rainfall From 22nd to 24th were a series of storms. 2.30 in. fell in 3 days. Heaviest storm 1.16 in. on 23rd.	2.54	Precipitation Form of rain and snow. A 3 days storm 22nd to 24th 2.38 in. water fell. Heaviest 1.28 in. in 20 hours.	2.50
Nov.	No precipitation during month of Nov.		Only a trace of precipitation for month of November.	
Dec.	"Snow"—trace.		"Snow"—trace.	
Total.		18.29	Total	16.87

The catchment of water during the season of 1914 is shown in tabulation given below; also the amount of water used:

Date		Gage Height	Acre-Feet Used	Acre-Feet Increment
Jan. 18		15.7		
Jan. 19	An increment 0.2 ft. from melting snow, or,	15.9		40
Feb. 20		15.7		
Feb. 23	An increment of 00.9 ft. melting snow along creek, equivalent to	16.6		182
Apr. 30		15.6		
May. 3	An increment 35.6 from heavy protracted storm being general all over the country, rainfall varying with locality to very high degree. The volume or acre-feet in this flood amounts to	51.2		21640
	This storm lasted from Apr. 28 to May 1st—total rainfall in four days 4.04 at Reservoir Station, and at Two Buttes Sta. 3.74. The water ceased to rise in the Reservoir at 9:00 a. m. May 2, but there was an inflow which continued for several days; this inflow was 700 sec. ft. at 6:00 p. m. May 2nd and about 50 cubic second feet at 6:00 p. m. May 7th.			
June 10	Gates opened for first run of water of the season	50.5		
June 15	End of run 6 days	48.8		
June 15	1.7 ft. of water used or		1895	
June 15	Gage Height	48.8		
June 17	A rise of 1.8 ft. giving an increment of 2,000 acre ft. This flood apparently from a heavy rain preceded by several light rains. Two Buttes Sta. records: rain for 5 days, 12th to 16th, in which the total rainfall was 2.41 in. one storm of the three of 2.00 in. (15th). The Reservoir Sta. shows only one rain, 15th, 2.57 in.	50.6		2000
July 5	Beginning run of water	49.8		

Date		Gage Height	Acre-Feet Used	Acre-Feet Increment
July 8	Morning 1.0 ft. of water used	48.8		
July 8	Evening Gage showed rise 2.1 ft. during night. Above "outflow" an increment of 2350 acre feet	50.9		2350
July 14	End of run. Gate closed	49.9		
	Water used and no. days run		2225	
	The Reservoir Sta. shows a rain 0.12 in. July 7th duration 1 hr. Two Buttes Sta. shows two days rain aggregating .06 in.			
July 17	Gage Height	49.8		
July 20	A 3 days run of the creek give a rise of 6.2 ft. by gage or 7820 acre ft. This flood came from a series of storms apparently beginning with the 17th until 23rd. The total rainfall at reservoir indicates 2.68 for the 6 days. Heaviest storm on the 18th. Duration 12 hrs. with 1.35 in. rainfall. The following day shows 0.84 in.— 12 hrs.	56.0		7820
	As noted above, the rise in the reservoir was continued during three days time but there was a continuous and varying inflow of from 50 second feet to 400 second feet in the creek 17 days after the reservoir ceased to rise.			
July 24	Gage height	56.0		
July 26	Evening showed a rise of 1.9 ft.	57.9		2680
	Two Buttes Sta. shows a rain of 0.23 and .32 for 22 and 23rd. The Reservoir Sta. gives only one rain of .10 in. on 28th, 1 hr. duration. The increment was probably part of the water from storms the preceding week.			
Aug. 1	Gage Height	57.7		
Aug. 5	Beginning with Aug. 1st creek flowed until the 5th, resulting in 2.0 ft. rise	59.7		3190
	Reservoir rainfall two storms of .24 and .23 precipitation 1st and 5th respectively. Two Buttes Sta. 0.62, 4th Aug.			
Aug. 18	Gage Height	58.6		
Aug. 29	Gage Height a. m.	56.7		

Aug. 30	Rise of 0.40 ft. during day	57.1		360
Aug. 30	Gates closed end of irrigation 13 days run 1.5 ft. of water used or	57.1	3056	
	This run was attended with exceptionally hot weather, weeds absorbed large portion of water. About 1400 acres irrigated.			
Sept. 30	Gates opened for run of water	55.9		
Oct. 9	Gates closed, end of run	54.5		
	1.4 ft. of water used equivalent to 800 acres land irrigated. Run of 10 days. Last run of season		1870	
Oct. 25	A small inflow of from 125 to 250 cubic second feet was noted in the creek, but the reservoir level was not raised appreciably.			
Dec. 18	Gage height	54.0		
Total			9046	40262

The quantity of water impounded during the year, as noted above, is 40,262 acre feet, but this does not include the amount lost through primary absorption in the reservoir itself. Just what this amount is we have no means of knowing, but from observation taken of the inflow after the Gage ceased to mark a rise in the water level in the reservoir, we would place this amount conservatively at 10,000 acre feet, and in all probability it far exceeded it. The present water level in the reservoir is 54 feet, and our available supply about 30,000 acre feet. During the year 1914 our measurements show that we used 9,046 acre feet for irrigation, running the water for 39 days. However, owing to the absorption and saturation going on in the reservoir all the time as well as evaporation, we believe that not over one-half of this amount was actually run in the canals—the records to the contrary, notwithstanding, and this estimate of 4500 acre feet coincides with the measurement of No. 1 rating crew.

The number of farms under irrigation is slightly over 21% of the total. Our statistics do not cover exact acreage, but we estimate that about 3,000 acres were furnished with water during the season. Of this land, 996 acres are now producing alfalfa. There are about 750 acres in fall wheat at the present time. The acreage under irrigation next year should be not less than 8,000 acres, and possibly it will go to 10,000 acres. For this purpose we have plenty of water available and doubtless our supply will be sufficient, assuming an ordinary rate of development for the next three years even though we should have an extremely dry year.

Our canal system has given us no trouble whatever during the year and there have been no breaks or leaks or undue loss of water. We have had a little trouble with our sluice gates, and necessary repairs will have to be made upon these gates. Altogether, however, the system may be said to be in perfect working order and we believe it can be as economically operated as any new irrigation system in the country. Loss due to seepage in the canals is constantly diminishing, and we have been able to deliver approximately 80% of the amount turned out of the headgate to the farmer.

Very truly yours,

TWO BUTTES IRRIGATION & RESERVOIR COMPANY.

By (Signed) F. L. HARRIS,
General Manager.

CHAPTER VII

SEEPAGE INVESTIGATIONS

Seepage measurements have been resumed since in the opinion of the present Engineer these are valuable to all of the users of water and may be used in estimating the amount of the available water supply and what it is believed to accomplish. They are also valuable in contests relative to the transfer of water.

Seepage measurements have been suspended for four years, the former Engineer believing that their value was not commensurate with the cost. In the Sixteenth Biennial Report, p. 135, he criticises seepage measurements and gives his reasons for this belief that they are not only seriously in error but are misleading. He states five reasons, with none of which the present Engineer agrees.

An absolutely permanent condition of the stream is not necessary, because if the measurements are made properly changes in stream flow are taken into account.

If the measurements are properly made the surface inflow is taken into account, each surface stream entering the river is measured as well as each diversion from the river. To be sure, a considerable portion of the surface inflow as it appears at the river is really seepage which enters the gulches and draws, and if it is desirable to have the total return seepage, each of these gulches, draws or streams can be investigated independently and the return seepage in each determined.

While the ground water is not entirely due to the application of water to irrigate lands, yet we know that before irrigation was practiced the ground water inflow was not sufficient to keep up the losses from evaporation in the river after it entered the plains areas, and we know also that the quantity from sources other than irrigation are small and practically negligible, so that if there is any error in the seepage measurements they show too small return, for these return waters make up the deficiency or loss and in addition show a considerable increase in the flow of the stream where formerly there was an actual loss.

The accuracy of the measurements is of course relative rather than absolute, but the seepage measurements are made with the greatest care and the errors are largely compensating, so that considering the return seepage on a stream as a whole the results are sufficiently accurate and reliable for all practical purposes.

It is not necessarily assumed that the conditions found to prevail at the time the measurements are made prevail throughout the year. Such an assumption would be erroneous in some cases and in others would be proper. Seepage measurements have been made at different times of the year and there is no data at hand that either proves or disproves that the seepage as determined is not approximately the same throughout the year. Where the valley is broad, with numerous parallel ditches reaching as much as ten miles from the river, as is the case in the Poudre River, the return seepage is quite constant. The water percolates through the soil at the rate of perhaps a mile a year and a great reservoir exists beneath the surface which discharges its water into the water courses at a fairly uniform rate. Where there are few ditches and these lie close to the river and the subsoil is open and porous there is of course a wide variation in the amount of return seepage in different times of the year, and those using the seepage measurements should be sufficiently familiar with the local conditions to properly use the data furnished. Merely because certain records are misused by some persons not qualified to use them intelligently is no reason for not presenting them for the uses where they can be properly used. Whatever the accuracy may be or whatever the misuse may be the methods which have been employed are the best yet devised. It is impractical to determine the seepage through the maintenance of permanent gaging stations. The permanent station at Platte Canon and at Denver give nothing whereby the seepage can be determined. To make such records available for that purpose it would be necessary to have automatic registers at these stations and most accurate rating curves and permanent channels. An automatic register would have to be kept on every ditch and on every inflow stream and these stations would be so numerous that the cost would be prohibitive and we would merely be getting by an indirect method what can be more easily gotten by the present direct method. In presenting seepage measurements, full and direct detailed notes should accompany them and those using seepage measurements should consult field notes from the original field books which, it must be assumed, contain all of the necessary information as to local conditions at the time the measurements were made.

During 1915 and 1916 it is proposed to conduct the seepage measurements by the use of a larger number of men, dividing the river into sections and assigning a short division to each hydrographer, so that he may keep an accurate record of the inflow and outflow during the time of the investigations.

SEEPAGE MEASUREMENTS

Seepage measurements were made in 1913 on the South Platte River by Thomas Grieve, Jr., C. C. Hezmalhalch, M. E. Bunger and C. O. Crisman; on Bear Creek and Clear Creek by Thomas Grieve, Jr.; on South Boulder Creek, Dry Creek, Boulder Creek, St. Vrain Creek, Big Thompson Creek and Cache la Poudre

River by D. L. Bundy; on the Arkansas River by B. S. Clayton; on the Rio Grande by B. S. Clayton and C. O. Crisman; on Rifle Creek by C. L. Chatfield.

In 1914, measurements were made on Bear Creek, Clear Creek and Cache la Poudre River by Thomas Grieve, Jr., and D. L. Bundy; on St. Vrain Creek and Big Thompson Creek by Thomas Grieve, Jr., and C. C. Hezmalhalch; on the Arkansas River by M. E. Bunger and D. L. Bundy; on the Rio Grande by R. I. Meeker and H. D. Amsley.

The measurements made on Boulder Creek in 1913, are omitted as unreliable on account of frequent fluctuations in the stream caused by the power plant above Boulder.

Measurements were also made on the Purgatoiré River, but conditions were very unfavorable for good results and they are therefore omitted.

Measurements on the Rio Grande for 1914 will be found in another chapter of this report.

CACHE LA POUDRE RIVER

In 1913, conditions for seepage measurements were considered good, except for the intermittent running of water by the Larimer and Weld Canal. This Canal is forced to let water by, to run the flour mill at Fort Collins, and takes the water up again when the mill is shut down in the evening. There is also a variation in the amount of water wasted by the sugar factories along the stream, but it is probably too small to make any appreciable difference in the final results.

In 1914, the stream was very low at the mouth of the Canon and for the upper part of the River conditions were even better than in 1913. To obviate any effect the intermittent running of water by the Larimer & Weld Canal might have, measurements were concluded on the first day at a point below the intake of the No. 2 Reservoir. A fall in the River is shown at this point the next morning, which is no doubt due to water having been turned into the Larimer & Weld Canal the previous evening.

The large gain in the section from the Ogilvy Ditch to the mouth, is due to a rainstorm the day before the measurements were made.

BIG THOMPSON CREEK

The conditions on this stream both 1913 and 1914 were very good, except for the section from below the Big Thompson and Platte River Ditch to the mouth. This section for 1914 shows too great a return and is due to a rainstorm which occurred the day before the measurements were taken. This storm caused the measurements to be abandoned for about a week.

ST. VRAIN CREEK

The return flow in the sections from below the mouth of Boulder Creek to the mouth of St. Vrain Creek, is liable to error on account of the fluctuation in the flow of Boulder Creek caused by the power plant near Boulder.

The drop in the Creek shown by the measurements at Longmont, is due to water being turned into the Supply Ditch early in the evening of the day before.

CLEAR CREEK

Measurements on Clear Creek in 1913 may have been affected slightly by a light snow storm. The ground was so dry at this time that it is believed that there was very little run-off from this storm.

In 1914 the gain from the gaging station to a point below the head of the Rocky Mt. Ditch appears too large, and can only be explained by a fluctuation in the Creek.

The section gain from the head of the Slough to a point above the mouth of Ralston Creek also appears too large. This may be due to the fact that a number of small ditches taking water from the Slough or branch of the Creek, may have wasted water back directly into the Slough, as apparently no irrigation was being done at this time.

BEAR CREEK

The results on Bear Creek for both 1913 and 1914 are considered good. The slightly larger gain shown in 1914 is due to reservoirs being filled to capacity and the plentiful supply of water available during the year.

SOUTH PLATTE RIVER

Results on the South Platte River are considered good. There was considerably more water from Platte Canon to the head of the Bijou Ditch than was consistent for good results, but below the Bijou Ditch the conditions were exceptionally good.

Measurements in 1914 were abandoned on account of high water.

ARKANSAS RIVER

Measurements were made on this stream in 1913 from La Junta to Holly. The conditions were excellent and results are considered good.

In 1914, the results above La Junta cannot be considered good on account of high water which prevented the measurements on the River being taken by wading and the choice of sec tions being necessarily limited to bridges. The results below La Junta should be good.

SEEPAGE MEASUREMENTS ON SOUTH PLATTE RIVER

November, 1913

Place Where Measurements Were Taken	Total Distance in Miles	Amount in River	Section Inflow	Section Outtake	Section Gain or Loss	Total Gain or Loss
Below Highline Waste	0	127				
Below Last Chance Ditch	3	129	0.5	6.9	8.4	8.4
Howarth Bridge	6	129	0	0	0	8.4
Howarth Bridge		202				
Littleton	12	240	25	0	12.7	21.1
Littleton		143				
Petersburg	15	187	23.4	0	20.6	41.7
Denver	22	233	19.9	1.8	27.9	69.6
Denver		220				
Below Burlington Ditch	26	16	70.5	314	39.5	109.1
Below Fulton Ditch	33	82	36.0	3.7	33.7	142.8
Below Fulton Ditch		89	1			
Brighton	41	127	14.0	16.1	40.1	182.9
Brighton		118				
One mile below Lupton	50	164	14.0	3.6	35.6	218.5
One mile below Lupton		138				
Platteville	58	148		5.3	15.3	233.8
Platteville		159				
Above mouth St. Vrain Creek	62	170	0	0	11.0	244.8
Evans Bridge	70½	253	145	142	80.0	324.8
Evans Bridge		237				
Above mouth of Cache la Poudre	77½	396	113	0	46.0	370.8
Kersey Bridge	80½	536	83	0	57.0	427.8
Kersey Bridge		562				
Hardin	90½	342	0	241	21.0	448.8
Below Putnam Ditch	102½	36	0	370	64.0	512.8
Orchard	111	136	0	5.5	105.5	618.3
Orchard		131				
Weldona	120	42.9	0	148	59.9	678.2
Fort Morgan	129	72.3	8.0	32.1	53.5	731.7
Snyder	140	81.3	7.2	84.9	89.7	821.4
Snyder		82.6				
Balzac	147	89.9	0	39.0	46.3	867.7
Merino	158	173	0.3	4.4	87.2	954.9
Sterling	171¾	167	9.0	56.1	41.1	996.0

SEEPAGE MEASUREMENTS ON SOUTH PLATTE RIVER—Concluded

Place Where Measurements Were Taken	Total Distance in Miles	Amount in River	Section		Section Gain or Loss	Total Gain or Loss
			Inflow	Outtake		
Iliff	183½	197	12.5	14.2	31.7	1027.7
Crook	200½	23 0	0	221	47.0	1074.7
Sedgwick	215½	8.3	0	35.7	21.0	1095.7
Julesburg	230½	42.2	1.0	.0	32.9	1128.6

SEEPAGE MEASUREMENTS ON BEAR CREEK

October, 1913

Place Where Measurements Were Taken	Total Distance in Miles	Amount in Creek	Section		Section Gain or Loss	Total Gain or Loss
			Inflow	Outtake		
Morrison	0	54.1	....	....	....	....
Below headgate Pioneer-Union Ditch	4	41.7	0	13.4	1.0	1.0
Below headgate Pioneer-Union Ditch	....	42.4	....	....	....	....
Jefferson-Arapahoe Co. Line	9	65.0	5.8	....	16.8	17.8
Mouth	12	63.2	....	0.3	1.5	16.3

SEEPAGE MEASUREMENTS ON BEAR CREEK

October, 1914

Place Where Measurements Were Taken	Total Distance in Miles	Amount in Creek	Section		Section Gain or Loss	Total Gain or Loss
			Inflow	Outtake		
Morrison	0	38.5	....	....	....	....
Below Pioneer-Union Ditch	4	0 4	0.5	40.7	2.1	2.1
Jefferson-Arapahoe Co. Line	9	17.8	....	....	17.4	19.5
Jefferson-Arapahoe Co. Line	....	18.2	....	....	....	....
Mouth	12½	19.0	0.2	1.4	2.0	21.5

SEEPAGE MEASUREMENTS ON CLEAR CREEK

October, 1913

Place Where Measurements Were Taken	Total Distance in Miles	Amount in Creek	Section		Section Gain or Loss	Total Gain or Loss
			Inflow	Outtake		
Two miles above Golden	0	125	....	....	....	....
Below headgate Rocky Mt. Ditch	3	2.3	14.6	141.9	4.6	4.6
Below headgate Rocky Mt. Ditch	....	2.9	....	....	....	....
Head of Slough	5	0	0	3.1	0.2	4.8
Above mouth of Ralston Creek	11	6.6	0	0	6.6	11.4
Below Clear Creek and Platte River Ditch	14½	0	9.4	24.2	14.8	26.2
Near mouth	17	2.6	0	0	2.6	28.8

SEEPAGE MEASUREMENTS ON CLEAR CREEK

October, 1914

Place Where Measurements Were Taken	Total Distance in Miles	Amount in Creek	Section		Section Gain or Loss	Total Gain or Loss
			Inflow	Outtake		
Gaging station 2 mi. above Golden	0	95.7	....	....	....	....
Below Rocky Mt. Ditch	3	53.5	9.3	74.3	22.8	22.8
Above head of slough	5	55.6	....	2.9	5.0	27.8
Above head of slough	....	49.0	....	....	....	....
Above mouth of Ralston Cr.	11	53.0	2.8	24.9	26.1	53.9
Below Clear Cr. and Platte River Ditch	14½	11.8	5.4	50.0	3.4	57.3
Below Clear Cr. and Platte River Ditch	....	12.9	....	....	....	....
Mouth	17	19.1	1.2	....	5.0	62.3

SEEPAGE MEASUREMENTS ON SOUTH BOULDER CREEK

October, 1913

Place Where Measurements Were Taken	Total Distance in Miles	Amount in Creek	Section		Section Gain or Loss	Total Gain or Loss
			Inflow	Outflow		
Eldorado Springs	0	21.3	....	....	....	....
Below head of Dry Creek	5.5	5.7	....	10.5	—5.1	—5.1
Mouth	8	5.9	....	....	7.4	2.3

SEEPAGE MEASUREMENTS ON DRY CREEK

October, 1913

Place Where Measurements Were Taken	Total Distance in Miles	Amount in Creek	Section		Section Gain or Loss	Total Gain or Loss
			Inflow	Outflow		
Head	0	0.1	....	....	....	....
Mouth	5.5	0.7	....	....	0.6	0.6

SEEPAGE MEASUREMENTS ON ST. VRAIN CREEK

October, 1913

Place Where Measurements Were Taken	Total Distance in Miles	Amount in Creek	Section		Section Gain or Loss	Total Gain or Loss
			Inflow	Outflow		
Gaging Station ½ mi. below Lyons	0	81.6	....	....	....	....
Below Oligarchy Ditch	3	5.4	3.7	84.0	4.1	4.1
Below Niwot Ditch	6	5.1	0.3	2.9	2.3	6.4
Longmont	9	4.9	0	5.1	4.9	11.3
Longmont	....	4.9	....	....	....	....
Dixon's Mill	12	38.1	26.0	0.2	7.4	18.7
Below Boulder Creek	15	48.7	5.9	0	4.7	23.4
Fleming Bridge	20½	75.7	17.5	0.2	9.7	33.1
Mouth	27	86.6	0	0	10.9	44.0

SEEPAGE MEASUREMENTS ON ST. VRAIN CREEK

October, 1914

Place Where Measurements Were Taken	Total Distance in Miles	Amount in Creek	Section		Section Gain or Loss	Total Gain or Loss
			Inflow	Outtake		
Gaging Station near Lyons	0	82.8	....	....	....	....
Below Oligarchy Ditch	3	34.7	0	53.3	5.2	5.2
Below Pella Ditch	6	45.9	4.6	1.0	7.6	12.8
Longmont	9	48.9	....	3.6	6.6	19.4
Longmont	....	23.1	....	....	....	....
Dixon's Mill	12	59.9	29.6	....	7.2	26.6
Below Boulder Creek	15	144	72.3	....	11.8	38.4
Fleming bridge	20½	154	0.5	....	9.5	47.9
Mouth	27	164	....	....	3.9	51.8

SEEPAGE MEASUREMENTS ON BIG THOMPSON CREEK

October, 1913

Place Where Measurements Were Taken	Total Distance in Miles	Amount in Creek	Section		Section Gain or Loss	Total Gain or Loss
			Inflow	Outflow		
Below Home Supply Dam	0	3.5	....	....	....	....
Below Barnes Ditch Headgate	5	0	16.1	26.0	6.4	6.4
Below Loveland and Greeley Canal	8	0	0	3.2	3.2	9.6
Below Lytle Bridge	16	20.8	18.1	8.4	11.1	20.7
Below Hill and Brush Ditch	21	20.6	0	0	—0.2	20.5
Below Hill and Brush Ditch	....	21.9	....	....	....	....
Below Big Thompson and Platte Riv. Ditch	26	31.1	0	0.2	9.4	29.9
Below Evans Town Ditch	34	72.3	29.2	5.4	17.4	47.3

SEEPAGE MEASUREMENTS ON BIG THOMPSON CREEK

October, 1914

Place Where Measurements Were Taken	Total Distance in Miles	Amount in Creek	Section		Section Gain or Loss	Total Gain or Loss
			Inflow	Outtake		
Home Supply Dam	0	78.1	....	....	....	....
Below Barnes Ditch	5	5.8	1.7	84.8	10.8	10.8
Below Greeley and Loveland Canal	8	0	....	8.0	2.2	13.0
Lytle Bridge	16	23.1	20.5	6.4	9.0	22.0
Below Hill and Brush Ditch	21	23.6	....	....	2.2	24.2
Below Hill and Brush Ditch	....	23.5	....	....	....	....
Below Big Thompson and Platte Valley Ditch	26	27.9	....	10.4	14.8	39.0
Mouth	34	58.4	20.8	35.9	45.6	84.6

SEEPAGE MEASUREMENTS ON CACHE LA POUDRE RIVER

October, 1913

Place Where Measurements Were Taken	Total Distance in Miles	Amount in River	Section		Section Gain or Loss	Total Gain or Loss
			Inflow	Outtake		
Gaging Station Mouth of Canon	0	205				
Below Larimer County Canal	4	187	0	20.4	12.4	12.4
Below Larimer and Weld Canal	10	83.1	0	129.7	25.8	38.2
Below Larimer and Weld Canal		45.1				
Below No. 2 Res. Inlet	14.5	33.8	12.2	43.8	20.3	58.5
Below Fossil Cr. Res. Inlet	17.5	3.3	11.2	51.3	9.6	68.1
Below No. 2 Canal	22	12.5	4.8	0	4.4	72.5
Below Eaton Ditch	25	0.9		16	4.4	76.9
Below Jones Ditch	32.5	24.6	8.8	14.7	29.6	106.5
Below Jones Ditch		24.4				
Below Old Greeley Water Wks	37.5	53.7	0	1.6	30.9	137.4
Below Ogilvy Ditch	40.0	94.5	7.5	0.5	33.8	171.2
Near Mouth	41.5	106	8.1	0	3.4	174.6

SEEPAGE MEASUREMENTS ON THE CACHE LA POUDRE RIVER

October, 1914

Place Where Measurements Were Taken	Total Distance in Miles	Amount in River	Section		Section Gain or Loss	Total Gain or Loss
			Inflow	Outtake		
Gaging Station	0	82.5				
Below Larimer Co. Canal	4	61.1		24.6	3.2	3.2
Below New Mercer Ditch	7	51.6		17.1	7.6	10.8
Below Larimer and Weld Canal	10	61.6			10.0	20.8
Below Reservoir No. 2 Supply Ditch	14.5	15.6	3.5	69.5	20.0	40.8
Below Reservoir No. 2 Supply Ditch		8.1				
Below Fossil Cr. Res. Inlet	17.5	0.3		20.6	12.8	53.6
Below No. 2 Canal	22	0		5.6	5.3	58.9
Below Eaton Ditch	25	2.8			—0.7	58.2
Below Jones Ditch	32.5	24.2	6.5		14.9	73.1
Old Greeley Water Wks	37.5	49.4			25.2	98.3
Old Greeley Water Wks		57.6				
Below Ogilvy Ditch	40.0	80.3	8.2		14.5	112.8
Mouth	41.5	125	4.3		40.4	153.2

SEEPAGE MEASUREMENTS ON THE ARKANSAS RIVER, LA JUNTA TO HOLLY

March, 1913

Place Where Measurements Were Taken	Total Distance in Miles	Amount in River	Section		Section Gain or Loss	Total Gain or Loss
			Inflow	Outflow		
La Junta	0	23	....	....	....	....
Las Animas	19	57	7	15	42	42
Lamar	37	98	35	47	53	95
Holly	61	167	0	0	69	164

SEEPAGE MEASUREMENTS ON THE ARKANSAS RIVER

October and November, 1914

Place Where Measurements Were Taken	Total Distance in Miles	Amount in River	Section		Section Gain or Loss	Total Gain or Loss
			Inflow	Outtake		
Buena Vista	0	271	....	....	....	....
Bray Bridge	6	289	0	0	18.0	18.0
Salida	26	407	62.5	14.7	70.2	88.2
Howard	38	482	73.7	10.7	12.0	100.2
Texas Creek	57	618	18.3	0.5	118.2	218.2
Canon City	81	512	49.4	112.2	—43.2	175.0
Three miles below Florence	94	633	98.5	56.4	78.9	253.9
Carlisle	100	607	40.2	74.3	8.1	262.0
Pueblo	124	598	2.0	39.6	28.6	290.0
Pueblo	....	464	....	....	....	....
Vineland	134	572	116.7	15.2	6.5	296.5
Boone	148	701	2.0	0	127.0	423.5
Nepesta	158	474	10.0	227.7	—9.3	414.2
Manzanola	178	474	55.2	51.8	—3.4	410.8
Below Ft. Lyon Canal Dam	200	0	....	....	....	....
La Junta	203	54.1	42.5	0	11.6	422.4
Hadley	212½	89.3	0	0	35.2	457.6
Las Animas	222½	110	9.0	36.8	48.5	506.1
Caddoa	238½	260	45.6	0	104.4	610.5
Caddoa	....	210	....	....	....	....
Prowers	250	142	1.5	68.6	—0.9	609.6
Lamar	259	5.0	0	164.4	27.4	637.0
Morse	265	31.5	7.0	7.0	26.5	663.5
Grote	271½	34.5	0	21.8	24.8	688.3
Granada	278½	52.0	3.5	0	14.0	702.3
Holly	290	63.6	....	10.0	21.6	723.9

SEEPAGE MEASUREMENTS ON THE RIO GRANDE
October, 1913

Place Where Measurements Were Taken	Total Distance in Miles	Amount in River	Section		Section Gain or Loss	Total Gain or Loss
			Inflow	Outflow		
Del Norte	0	650				
Seven Mile Bridge	7	526		93	—31	—31
Monte Vista	15	517		27	18	—13
Below Centennial Ditch	22	521		8	12	—1
Alamosa	33	478		46	3	2
Hanson's Ranch	43	461	1		—18	—16
La Sauces	58	562	74	1	28	12
La Sauces		490				
State Bridge	72	490			0	12
Dunn's Bridge, New Mexico	102	641	24		127	139
Embudo, New Mexico	137	742	98		3	142

SEEPAGE MEASUREMENTS ON RIFLE CREEK
September, 1913

Place Where Measurements Were Taken	Total Distance in Miles	Amount in Creek	Section		Section Gain or Loss	Total Gain or Loss
			Inflow	Outflow		
Power House	0	39.5				
Below Parrish and Mann Ditch	3	13.4		26.5	0.4	0.4
Below Rifle Creek Canon Ditch	6.5	8.2	5.1	11.3	1.0	1.4
Below Wisdom Ditch	10.5	1.6		9.3	2.7	4.1
Below Pioneer Ditch	14	7.3	1.6	0.3	4.4	8.5

RIO GRANDE SEEPAGE INVESTIGATIONS.

Section 1, October 27, 1914.

	Name of Stream or Ditch	Section Discharge Sec. Ft.	Inflow Sec. Ft.	Outflow Sec. Ft.
			+	—
(a)	Rio Grande 500′ above water tank at So. Fork, Colo.	517		
	Willow Creek at mouth		4.5	
	Bear Creek at mouth		1.5	
	Highwater Ditch			0.0
	Anaconda Ditch			2.1
	Hillsdale Ditch			0.0
	Shaw Creek at mouth		1.4	
	Minor Ditch			0.8
	Hosselkus Ditch			0.0
	Meadow Glen Ditch			0.4
	Pfeifer Ditch			0.0
	Myer or Embargo Creek at mouth		6.8	
(b)	Independent Ditch No. 2			0.8
(c)	Wolf Creek (Intercepted by Minor Ditch)		0.0	
	Ehrowitz Ditch			2.0
	Knoblauch Ditch			0.0
	Bauer Ditch			0.0
	Corson Ditch			0.0
(d)	Rio Grande at Del Norte Gaging Station seven miles above Del Norte	550		
	Totals		+14.4	—6.1

Total Inflow		14.4	sec. ft.
Total Outflow		6.1	"
Difference		+8.3	"
Flow at beginning of section plus inflow minus outflow	517 8.3 =	525.3	sec. ft.
Apparent gain	550— 525.3 =	+24.7	"

Length of section 9 miles.

Remarks:

NOTE—(a) Measured above a riffle; cross section of cobbles and small boulders 2 to 12 inches in diameter, surface smooth and current even.

(b) Independent ditch was picking up 0.25 ± sec. ft. seepage water from Ewing drainage ditch.

(c) Wolf Creek discharge at South road crossing estimated 0.1 sec. ft.

(d) Measured a. m. Oct. 28. No change of stage during night, as determined by gage readings measured from State bridge on account of depth of water: section chiefly of sand and gravel, some boulders up to 2 ft. in diam.

(e) Small ditches from Meyer and Wolf Creeks diverting small heads of water for stock purposes.

(f) A total surface seepage return of 1 sec. ft. observed in this section intercepted by ditches.

Section 2, October 28, 1914

	Name of Stream or Ditch	Section Discharge Sec. Ft.	Inflow Sec. Ft.	Outflow Sec. Ft.
			+	—
	Rio Grande at Del Norte Gaging Station	550		
(a)	Slough ¼ mile below Del Norte Gaging Station		0.3	
	Hallett Ditch			0.0
(b)	Slough on Bauer Ranch		0.4	
(c)	Slough ¼ mile above mouth Schrader Creek on Voss Ranch		3.3	
(d)	Schrader Creek		0.5	
	Park and Green Ditch			0.0
(e)	Los Pinos Creek		7.5	
(f)	Del Norte Town Ditch			0.1
	Rio Grande Canal			42.4
(g)	Rio Grande 300 ft. above Del Norte Bridge	498		
	Totals		+12.0	—42.5

Total Inflow........ 12.0 sec. ft.
Total Outflow........ 42.5 "

Difference........ —30.5 "
Flow at beginning of section plus inflow minus outflow 550— 30.5 = 519.5 sec. ft.
Apparent loss........519.5— 498 = —21.5 "
Length of section 8 miles.

Remarks:

NOTE—(a) Surface Seepage Inflow: originates chiefly in Section 1.
(b) Surface Seepage Inflow.
(c) Surface Seepage Inflow. May contain a little waste water from ditches above and waste water from Independent and Meadow Glenn ditches.
(d) Surface Seepage Inflow.
(e) A slough carrying seepage water, estimated discharge 0.5 sec.-ft. intercepted by Los Pinos Creek. Pinos Creek discharge estimated as 50% seepage water.
(f) Del Norte Town Ditch flow 50% seepage water.
(g) Discharge of 498 sec.-ft. was measured at 10 a.m. Oct. 29. River showed rise of 0.02′ over stake set 6 p. m. Oct. 28. Measured by wading 300 ft. above Del Norte Bridge above riffle. Section of cobbles and small boulders.
(h) Entire inflow of this section except part of Pinos Creek is seepage from irrigated land and springs.
(i) Drainage ditch from Pinos Creek lands at West edge of Del Norte discharging 2.6 sec.-ft. seepage water at road crossing; enters river in Section 3.

Section 3, October 29, 1914

	Name of Stream or Ditch	Section Discharge Sec. Ft.	Inflow Sec. Ft.	Outflow Sec. Ft.
			+	—
	Rio Grande 300 ft. above Del Norte Bridge	498		
(a)	Mill Ditch fed from slough		2.8	
	Rio Grande Ditch No. 4 takes water via Mill Ditch			0.0
	Gus Weiss Ditch takes water via Rio Grande No. 4			0.0
	Midland Ditch			0.0
(b)	Rio Grande Ditch No. 1			2.3
	Rio Grande Ditch No. 2			0.3
	Kane and Kallan Ditch			0.2
(c)	Slough near Bridge No. 281A D. & R. G. Alamosa—Creede Branch		0.5	
	Brey Ditch			0.0
	Schachert Ditch			0.0
	New Raber Ditch			0.0
	Off's Ditch			1.0
	Raber Ditch			0.0
	Voss Ditch			1.6
	Hall Ditch			0.0
	McIntosh Arroyo Ditch			0.1
	Farmers Union Canal			117.7
	Cochran Pioneer Ditch			0.0
	Sylvia Ditch			3.4
	Atencio No. 2			1.1
(d)	Rio Grande 300′ below 7 mile bridge	379		
	Total		+3.3	—127.7

Total Inflow 3.3 sec. ft.
Total Outflow 127.7 "

Difference —124.4 "
Flow at beginning of section plus inflow minus outflow 498— 124.4 = 373.6 sec. ft.
Apparent gain 379— 373.6 = +5.4 "
Length of section 7 miles.

Remarks:

NOTE—(a) Seepage water from drainage ditch from Pinos Creek and waste water from Del Norte.
(b) 0.25 S. Ft. seepage water enters Rio Grande No. 1 near headgate.
(c) Not measurable on account of moss: estimated.
(d) Measured on Oct. 30 set stake night of Oct. 29. No change in water surface. Measured by wading 300 ft. below concrete bridge above riffle; section of cobbles and boulders from 2 to 10 inches diameter.
(e) Farmers Union, Atencio No. 2 Sylvia & McIntosh Arroyo Ditches measured morning of Oct. 30.

Section 4, October 30, 1914

	Name of Stream or Ditch	Section Discharge Sec. Ft.	Inflow Sec. Ft.	Outflow Sec. Ft.
			+	—
	Rio Grande 300 ft. below 7 mile bridge	379		
	Deitrich and Lacass Ditch			0.0
	Prairie Ditch			20.4
	McDonald Ditch via Prairie			0.8
	Monte Vista Canal			1.2
	Rio Grande and Piedra Valley or Rock Creek Ditch			9.9
	Pace Ditch			0.0
	Consolidated Canal			40.3
	Butler Ditch			0.0
	Star Ditch			0.0
	Anderson Ditch			0.0
	Atencio Ditch			0.0
	Hubbard No. 2 Overflow Ditch			0.0
(a)	Slough waste water from Monte Vista Rock Creek and Consolidated Canals		35.7	
	Fish Ditch			0.0
	Horner and Ydren 2 ditches			0.0
	Nichol Ditch			0.0
	Manson from left bank slough			0.0
	Seepage Slough left of river at Gunbarrel Road			0.0
(b)	Rio Grande 600 ft. below bridge on Gunbarrel Road	340		
	Total		+35.7	—72.6

Total Inflow		35.7 sec. ft.
Total Outflow		72.6 "
Difference		—36.9 "
Flow at beginning of section plus inflow minus outflow	379— 36.9 =	342.1 sec. ft.
Apparent loss	342.1— 340 =	—2.1 "
Length of section 8 miles.		

Remarks: San Jose or Lucero Ditch drawing 0.25 sec. ft. waste water from Monte Vista Canal. Navajo Ditch drawing .05 sec. ft. from Monte Vista slough. Rio Grande and San Luis Ditch drawing 0.6 sec. ft. from Consolidated Canal. Above quantities estimated. Rio Grande and Lariat Ditch drawing 0.2 sec. ft. from Consolidated Canal.

NOTE—(a) Measured Oct. 31. This is direct flow diverted and returned unused to the river with some picked up seepage water. What per cent is seepage water we are unable to say.

(b) Measured by wading above riffle; section of gravel and cobbles 2 to 4 inches in diameter, surface of water smooth.

Section 5, October 31, 1914

	Name of Stream or Ditch	Section Discharge Sec. Ft.	Inflow Sec. Ft.	Outflow Sec. Ft.
			+	—
(a)	Rio Grande 600 ft. below bridge on Gunbarrel Road. (No change in river from previous meas.)	340		
	James Patterson Ditch			0.0
	Ben Ogle			0.0
	Billings Ditch			0.2
	Seepage slough at railroad bridge ¼ mile above Empire Canal Headgate some sewage from Monte Vista		4.7	
	Empire Canal			8.2
	Seepage slough 200 feet above Centennial H. G.		1.7	
	Centennial Ditch			0.0
(b)	San Luis Valley Canal			0.5 E
	Blanca via San Luis V. C.			0.0
	Kenilworth Canal			0.0
(c)	Rio Grande 300 ft. below County Line bridge	349		
	Totals		+ 6.4	— 8.9

Total Inflow 6.4 sec. ft.
Total Outflow 8.9 "

Difference —2.5 "
Flow at beginning of section plus inflow minus outflow 340— 2.5 = 337.5 sec. ft.
Apparent gain 349— 337.5 = +11.5 "
Length of section 7 miles.

Remarks: E—Estimated.

NOTE—(a) Measured evening of 30th. Reference stake set. Less than 0.01 ft. difference in elevation of water surface.
(b) 2.8 sec. ft. discharging from drainage ditch and slough along west side of county road into San Luis Canal.
(c) Measured by wading; excellent section, coarse gravel up to 3" diameter.

Section 6, November 1, 1914

Name of Stream or Ditch	River Discharge Sec. Ft.	Inflow Sec. Ft.	Outflow Sec. Ft.
		+	—
Rio Grande 300 ft. below County line bridge	317		
Excelsior Ditch			8.1
a) Seepage slough on South side of river, East of County line		2.5	
Costilla Canal or San Luis Valley Irrigation Ditch			0.4
Independent or Maddox Ditch			0.0
Hickory Jackson Ditch			0.0
(b) Rio Grande 650 ft. below Concrete bridge at Alamosa	320		
Totals		+ 2.5	— 8.5

Total Inflow .... +2.5 sec. ft.
Total Outflow .... —8.5 "

Difference .... —6.0 "
Flow at beginning of section plus inflow minus outflow 317— 6 = 311. sec. ft.
Apparent gain .... 320— 311 = +9. "
Length of section 11 miles.

Remarks:
NOTE—(a) Estimated on account of moss and vegetation.
(b) Mean of measurements of Nov. 1, p. m. and Nov. 2, a. m., due to falling stage. Only 6 hours elapsed between measurements of Section 6 on Nov. 1. Section of shifting sand, velocities non-uniform.

Section 7, November 2, 1914

Name of Stream or Ditch	Section Discharge Sec. Ft.	Inflow Sec. Ft.	Outflow Sec. Ft.
		+	—
Rio Grande 650′ below Concrete Bridge at Alamosa	306		
South Sewer at Alamosa		0.6	
West Side Ditch			0.0
East Side Ditch or Rio Grande Ditch			0.2
Meadow Overflow or Swartz Ditch			0.0
Rio Grande ¼ mile below Meadow Overflow Ditch Headgate	319		
Totals		+ 0.6	— 0.2

Total Inflow .... 0.6 sec. ft.
Total Outflow .... 0.2 "

Difference .... +0.4 "
Flow at beginning of section plus inflow minus outflow 306+ .4 = 306.4 sec. ft.
Apparent gain .... 319— 306.4 = +12.6 "
Length of section 5 miles.

Remarks: Slightly falling stage in river. The main sewer from Alamosa discharges into the River in this Section, but the discharge was not measurable since the sewer outlet was submerged. The discharge of the sewer is estimated at 8 ± Sec. ft. on account of the large number of artesian wells which discharge into it.
NOTE—(a) Section of solid clay with bed of shifting blanket of sand along right half of section.

Section 8, November 3, 1914

	Name of Stream or Ditch	Section Discharge Sec. Ft.	Inflow Sec. Ft.	Outflow Sec. Ft.
			+	—
	Rio Grande ¼ mile below Meadow Overflow Ditch	310		
(a)	Alamosa River		20.6	
	Slough Old Channel		(e) 1.4	
(b)	La Jara Creek		30.2	
(c)	Trinchera Creek		0.2 E	
(d)	Rio Grande 100 ft. above Trinchera Ford at Stuarts Ranch	358		
	Totals		+52.4	— 0.0

Total Inflow ... 52.4 sec. ft.
Total Outflow ... 0.0 "
Difference ... 52.4 "
Flow based on measurement at beginning of section plus inflow minus outflow ... 310+ 52.4 = 362.4 sec. ft.
Apparent loss ... 358— 362.4 = —4.4 "
Length of section 10 miles.

Remarks: E—estimated, not measurable.

NOTE—(a) This water includes the flow from Rock Creek, which is part seepage and 10 sec. ft. of drainage water from the Outlet of the Carmel Drainage District.
(b) Includes some seepage water: amount unknown.
(c) South Reservoir about 10 miles above storing entire flow of Trinchera Creek.
(d) Measured above riffle; section of coarse gravel not over 3 inches diameter.
(e) Seepage water.

Section 9, November 4, 1914

	Name of Stream or Ditch	Section Discharge Sec. Ft.	Inflow Sec. Ft.	Outflow Sec. Ft.
			+	—
	Rio Grande 100′ above Trinchera Ford at Stuart's Ranch	349		
	Rio Conejos north channel		120.8	
	Rio Conejos south channel		8.4	
	Seepage Slough 1200 ft. north of La Sauces, Colo.		0.2	
	Seepage Slough 600 ft. north of La Sauces, Colo.		0.1	
	Waste Water from La Sauces ditch		1.2	
	Rio Culebra		0.0	
(a)	Rio Grande, Colo. N. Mexico Line (State Bridge)	489		
	Totals		+130.7	— 0.0

Total Inflow ... 130.7 sec. ft.
Total Outflow ... 0.0 "
Difference ... +130.7 "
Flow at beginning of section plus inflow minus outflow 349+ 130.7 = 479.7 sec. ft.
Apparent gain ... 489— 479.7 = 9.3 "
Length of section 21 miles.

Remarks:
(a) Measured at bridge by wading a. m. Nov. 5. River falling stage on Nov. 4.

Section 10, November 5, 6, 7, 1914

	Name of Stream or Ditch	Section Discharge Sec. Ft.	Inflow Sec. Ft.	Outflow Sec. Ft.
			+	—
	Rio Grande Colo. N. Mex. Line (State Bridge)	489		
(a)	Poncha Creek near mouth waste from Cove Lake Res.		6.4	
	Costilla Creek at mouth		0.0	
(b)	Latir Creek		0.0	
(c)	Rio Colorado		60.6	
(d)	San Cristobal Creek		0.7	
(e)	Rio Grande at Dunns Bridge	629		
	Totals		+67.7	— 0.0

Total Inflow		67.7 sec. ft.
Total Outflow		0.0 "
Difference		+67.7 "
Flow at beginning of section plus inflow minus outflow	489+ 67.7 =	556.7 sec. ft.
Apparent gain	629— 556.7=	+72.3 "

Length of section 32 miles.

Remarks:
- (a) Poncha Creek measured on Nov. 11, 1914. Same discharge on Nov. 5, 1914. Waste water from irrigation and Cove Lake Res.
- (b) Latir Creek is intercepted by Cerro Ditch: water being used for domestic and stock purposes.
- (c) Rio Colorado measured on Nov. 6, 1914.
- (d) San Cristobal Creek measured on Nov. 10, assumed discharge was same on Nov. 6.
- (e) Meas. at Dunn's bridge Nov. 7—8 a. m., 46 hours after initial measurement. Distance between State Bridge and Dunn's Bridge 32 miles.

NOTE—Attention is called to increase in flow of the Rio Colorado from Vigil's Mill (near Questa) through the lava box canyon to its mouth, a distance of approximately 8 miles.

Nov. 6, at Vigil's Mill	32.6 sec. ft.
Nov. 6, at Canyon mouth	60.6 "
Increase	28.0 "

Section 11, November 7, 8, 1914

Name of Stream or Ditch	Section Discharge Sec. Ft.	Inflow Sec. Ft.	Outflow Sec. Ft.
		+	—
Rio Grande at Dunns Bridge	629		
Arroyo Hondo (Rio Hondo) at mouth		14.6	
Rio Taos at mouth		30.6	
Arroyo del Aguago		0.0	
Rio Grande at Cienequilla (a)	622		
Totals		+45.2	— 0.0

Total Inflow........ 45.2
Total Outflow........ 0.0

Difference........ +45.2
Flow at beginning of section plus inflow minus outflow 629+ 45.2 = 674.2 sec. ft.
Apparent loss........ 622— 674.2 = —52.2 "
Length of section 14 miles.

Remarks:
(a) 24 hours elapsed between meas. at Dunns Bridge and measurement at end of section. River cross section of sand gravel and cobbles under 4 inches diameter. Excellent measurements.

Section 12, November 8, 1914

Name of Stream or Creek	Section Discharge Sec. Ft.	Inflow Sec. Ft.	Outflow Sec. Ft.
		+	—
(a) Rio Grande at Cienequilla	622		
Rito Cienequilla		0.2 E	
East Rinconnado Ditch			0.0
West Rinconnado Ditch			0.0
Embudo Creek at mouth		47.2	
(b) Rio Grande at Embudo Cable	698		
Totals		+47.4	— 0.0

Total Inflow........ 47.4 sec. ft.
Total Outflow........ 0.0 "

Difference........ +47.4 "
Flow at beginning of section plus inflow minus outflow 622+ 47.2 = 669.2 sec. ft.
Apparent gain........ 698— 669.2 = +28.8 "
Length of section 9 miles.

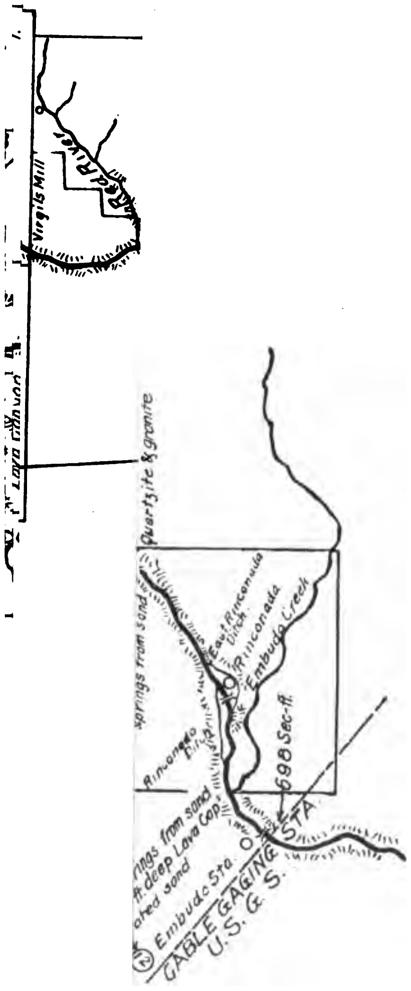
Remarks: E—estimated not measurable. Frequent springs observed from Sienequilla to Embudo on East and West side of river from sand outcrops forming sides of canyon except at Glenwoody on East side of river where unconsolidated sand is replaced by granites and quartzite.

(a) Excellent cross section and accurate measurement secured.
(b) At U. S. G. S. station. Measured from cable. Less accuracy secured at this station than at the Sienequilla ford measurement on account of depth of water and rough current along right bank.

RECAPITULATION

Section		Apparent		(a) Measured Seepage Return Surface Sec. Ft.
		Gain in Sec. Ft.	Loss	
1	South Fork to Del Norte Gaging Station 7 miles above Del Norte	24.7		
2	Del Norte Gaging Station to Del Norte Bridge		—21.5	(b) 9
3	Del Norte Bridge to 7 miles Plasa Bridge	5.4		3.5
4	7 mile Plaza Bridge (concrete) Monte Vista Gunbarrel Bridge		—2.1	
5	Monte Vista (Gunbarrel Bridge) to County Line Bridge	11.5		6.
6	County Line Bridge to Alamosa (concrete bridge)	9.0		2.5
7	Alamosa Concrete Bridge to clay outcrop on Schwarts Ranch ¼ mile below headgate Meadow Overflow Ditch	5.0		
8	Clay Outcrop Schwarts Ranch to Trinchera Ford near Stuarts Ranch		—4.4	(c) 11.4
9	Trinchera Ford to State Bridge Colo.-New Mexico line station	9.3		0.3
10	State Bridge Colorado to Dunns Bridge above mouth Rio Hondo	72.3		
11	Dunns Bridge to Ford at Cienequilla		—52.2	
12	Cienequilla Ford to Embudo Cable U. S. G. S. Station	28.8		
	Totals	+166.0	—80.2	32.7

(a) Includes overflow to river and seepage water intercepted by ditches.
(b) Allowance made for seepage in Los Pinos Creek.
(c) 10 Second-feet drainage water Carmel District.



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GENERAL CONCLUSIONS

From data and discussions hereto attached*, it is evident that the accurate determination of seepage losses or gains on a River of the magnitude of the Rio Grande, even at its low flow (500 second-feet) in October, when run-off and diversion conditions are fairly constant, is a problem of difficulty, with experienced Hydrographers and extreme care in metering.

A gradually falling stage and errors of measurement (due to roughness of cross sections) are a constant source of annoyance and introduce uncertainties which prevent the acceptance of numerical data at face value and require a discussion of each section. Even then only general inferences can be drawn. The deductions made from this investigation are only general and their application to other periods of the year or other years is dangerous.

Heretofore seepage investigations have reached the official publications in a tabular form with little or no discussion of conditions prevalent during the investigation or qualifications of data secured. If these data are published it is advised that a discussion accompany them and that they be qualified. Such notations are imperative, if proper weight be given the investigation.

Based on the preceding data and discussion it can be announced with some emphasis that there is no pronounced increase to the Rio Grande during the months of October and November from the irrigated lands of the San Luis Valley in Colorado. There is a slight increase which is partly evidenced by measured seepage inflow at various points on the different sections. Such inflow is qualified as "Surface Seepage Inflow".

During the irrigation season there is undoubtedly a greater inflow of seepage return waters to the Rio Grande from meadow lands directly adjacent and perhaps from some land beyond. Just how much is mere conjecture. It should be noted that the Valley floor is very flat and ditches and canals were observed intercepting small volumes of return seepage waters from irrigation.

Mention is made of the irrigated low, bottom meadow lands which extend almost without exception along the Rio Grande from Del Norte to La Sauces are devoted exclusively to native hay. The subsoil is very porous, being part of the old river bed. Water is applied copiously and returns occur quickly. This portion is directly comparable with meadow lands on the Laramie and Little Laramie Rivers in Wyoming where similar conditions exist, and where there is a large re-use of the water. The major part of the irrigated area of the San Luis Valley is not comparable with the irrigated lands of the Poudre, Arkansas and South Platte Valleys from the view-point of seepage returns.

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* Discussion is on file in the State Engineer's office.

Attention is directed to the fact that the greatest slope of the Valley lands from Monte Vista to Alamosa is toward the East, and roughly parallel to the course of the River. Lesser slopes occur to the south and north. Since the subsoil is sand and gravel and is quite porous, the trend of the underground waters on the north side of the River (except where disturbed by local conditions) is toward the north and east and away from the River. There are no natural drainage channels of magnitude in this area, until La Garita Creek is reached far to the North. On the south side of the river the general gradient is toward the south and east and roughly parallel or away from the Rio Grande. Rock Creek is the natural waterway here and undoubtedly picks up some seepage water. These facts then in a measure explain the lack or the meagre return waters from irrigated lands in the San Luis Valley to the Rio Grande. Natural drainage or general slope of the lands irrigated coupled with the very porous subsoil draw the return waters of irrigation directly away from the Rio Grande and it accumulates in the low, flat ground and is lost by evaporation, hence the need of drainage ditches in the vicinity of Mosca, Hooper and Dune on the north side and the seeped and alkalied areas to the south and west of Alamosa beyond Rock Creek, which require drainage.

There is undoubtedly an intimate relation between the Rio Grande and the water table of the San Luis Valley on account of the porous sub-soil. At times of the year during the irrigation season the water table from sub irrigation is higher than the water surface of the river, at other times lower, so that the movement of water reverses from one to the other.

In this connection, it should be pointed out that F. W. Swanson, Division Engineer, who came to the San Luis Valley in 1871, and has resided there almost continuously since that time, is authority for the statement that prior to irrigation of any magnitude, there was no alkali on the soil surface of the Valley and Rock Creek which is now a perennial stream, was generally dry from a point seven or eight miles west of Alamosa to its mouth during the fall and winter months.

This shows the importance of extending seepage investigations to Rock Creek, La Garita Creek and the tributaries at favorable times of the year.

As noted in the recapitulation, the largest apparent gain to the Rio Grande above Embudo in 1914, occurs, not in the irrigated area but in the lava canyon between the Colorado-New Mexico line and Dunns Bridge. This increase is in part directly chargeable to observed, frequent small springs in the canyon.

On pages 17 and 18 of Water Supply Paper No. 240, C. E. Siebenthal, Geologist, suggests and indicates that the increment from springs, in the Rio Grande canyon between Lobatos and

Embudo Stations may come from the artesian basin of the San Luis Valley. Siebenthal is inclined, however, to attribute the difference in flow of the River between the State Bridge and Embudo entirely to underground waters, making direct statement of practically no inflow from surface streams in New Mexico.

Such is not the case however and the surface flow to the Rio Grande between the Colorado-New Mexico station and the Embudo is large.

Hydrographic data is now extant which was not available at the time of Seibenthals Investigation, which, as I understand it, did not include field work in New Mexico.

Insufficient seepage measurements and related investigations have been secured on this section of the Rio Grande (Colorado-New Mexico line to Embudo) to make any definite statements as to location of inflow or volume added to the river from underground sources.

During August and September 1915 when the Rio Grande is low on account of diversions in Colorado, it would be advisable to do some additional work on that Section of the River extending from the State Bridge in Colorado to Cinequilla, using automatic water stage registers at various points in conjunction with the Register at the State line and securing records for a period of two weeks to a month. Only in this way can decisive figures be secured on the underground inflow. Work should also be done in the examination of the canyon and location of springs and their size and extent determined.

In conclusion then conditions encountered on the Rio Grande in Colorado and Northern New Mexico require special methods, greater efforts, and longer periods of time to secure dependable seepage data upon which to base reliable deductions.

CHAPTER VIII

DRAINAGE INVESTIGATIONS SAN LUIS VALLEY.

Detailed drainage investigations were commenced in May, 1914, when an irrigation engineer from the Denver office was sent to the San Luis Valley. The investigations are well under way but not far enough advanced to publish a comprehensive report. It will require all the 1915 field season to complete the investigations under way. The data herewith attached are advance in nature and subject to modification as the work progresses.

No effort will be made at this time to indicate the causes leading up to the need of drainage, other than to say that the slope of the porous valley floor is insufficient for rapid drainage. This fact, coupled with the excessive use of water by canals and waste from canals and artesian wells, has waterlogged the lands and brought alkali to the surface. Relief can come in two ways, by a more careful use of water and by artificial drainage, but both are imperative if the irrigated area is to grow.

WATER TABLE INVESTIGATIONS

During August and July, 1914, sixty-three observations were made of the water table in the San Luis Valley, extending on the north from Alamosa to beyond Moffat, on the south from Alamosa to Romeo and Manassa, on the east to the old river channel between Baldy and Alamosa and on the west to Monte Vista. The maximum depth to water was 7 feet, the minimum depth 1.25 feet, and the general depth to water was from 2 to 5 feet. The lesser depths being encountered on irrigated land, and the greater depths in the nonirrigated areas. Most of the observations were secured by making borings, which served at the same time to show the nature of the soil and subsoil. Water was invariably struck on penetrating the loose sand or gravel substratum which lies from 1½ to 7 feet below the general surface.

MAPPING OF IRRIGATED, SEEPED AND ALKALIED AREAS

During the summer work was commenced on the preparation of a map showing in a comprehensive way the irrigated lands, the seeped and alkalied areas and the raw lands of the Valley. 120,000 acres have been mapped. It will require the entire field season of 1915 to complete this phase of the work.

DRAINAGE DISTRICTS

The attached table shows the community attempts by land owners of the Valley to secure drainage and covers over 160,000 acres at a total cost of approximately $1,000,000.00.

DRAINAGE DISTRICTS. SAN LUIS VALLEY, COLORADO.

Name	Acreage	Cost	Status	Remarks
Parma Tract	7,500	a$25,000	Constructed	Additional work being done from time to time
Carmel Drainage District	5,040	55,000	Constructed	Constructed 1913 and 1914. Chiefly tile and wooden underdrains.
Saguache Drain Ditches	10,000	60,000	Constructed	Open ditches. Water developed used for irrigation.
Sylvester Tract	10,500	a 47,250	Constructed	Ditto.
San Luis Valley Drainage Dist.	70,000	350,000	Bonds issued	Unsold.
Moffat Irrigation District	50,000	400,000	Bonds issued	Unsold. (c.)
La Jara Drainage District	7,500	b 45,000	Bonds issued	Unsold.
	160,540	$982,250		

(a) Approximate.
(b) Estimated.
(c) Drainage water developed to be used in district includes some water by pumping and old ditch rights.
NOTE—A drainage district in process of formation between Monte Vista and Center at tne present time.

The most notable example of reclamation by drainage recently completed is the Carmel Drainage District located 12 miles southwest of Alamosa. The drainage, accomplished at a cost of $10.50 per acre, is very satisfactory and will undoubtedly result in the reclamation of more extensive areas by the same methods, namely: underground drains. The amount of water developed by drainage systems is a matter of some importance from the viewpoint of efficiency of the system and the amount of water made available for irrigation on lower lands. The attached measurements represent conditions prevailing in 1914.

MEASUREMENTS OF OUTLET, CARMEL DRAINAGE DISTRICT, JUST BELOW JUNCTION OF SUB-MAINS "A" AND "B", AT THE WEST ¼ CORNER OF SECTION 5, T. 36 N, R. 9 E

Date	Hydrographer	Volume Sec. Ft.	Remarks
1914			
May 28	(a) Stannard and Adams (b)	5.9	....
June 27	R. I. Meeker..............	9.5	System 50% completed.
July 23	R. I. Meeker..............	7.8	....
Aug. 26	R. I. Meeker..............	9.4	....
Sept. 23	R. I. Meeker..............	11.7	Fall irrigation to wash land of alkali commenced in dist. about Sept. 10.
Oct. 23	Meeker & Amsley..........	11.0	System completed on Oct. 31.
Nov. 24	H. D. Amsley..............	7.1	No ice in ditch.
Dec. 1	O. V. Adams (b)...........	7.3	....
Dec. 17	O. V. Adams..............	5.8	....
1915			
Jan. 2	O. V. Adams..............	5.5	....

(a) Engineer U. S. Reclamation Service.
(b) Engineer Carmel Drainage District.

MISCELLANEOUS MEASUREMENTS OF DEVELOPED DRAINAGE WATER.

Parma outlet ditch 1 mile south of Parma.
Sept. 23, 1914, 1.55 Sec. ft. by R. I. Meeker.
Saguache Drain Ditches, total of all laterals at Gibson
Sept. 24, 1914, (a) 5.30 Sec. ft. by R. I. Meeker.

(a) Laterals obstructed by water moss and vegetation.
Sylvester Drain Ditch at W 1/4 corner Section 30 T 41 N R 10 E.
Sept. 24, 1914, (b) 1.95 Sec. ft. by R. I. Meeker.

(b) 1.3 Sec. ft. of seepage water discharging from Noffsinger ditch into Sylvester ditch at head of Sylvester ditch. Sylvester ditch badly choked with Russian thistles at point of measurement.

Noffsinger Drain Ditch, at end.
Sept. 24, 1914, 1.20 Sec. ft. by R. I. Meeker.
" " " 1.15 " " lateral drawing water from Noffsinger ditch 1/2 mile above end.

Total 2.35

Note: Banks of Noffsinger Ditch along last 1/2 mile in bad shape; water overflowing and spreading in chico and greasewood.

Insufficient data have been secured at this time to draw any reliable deductions as to the volume of drainage water produced per 1000 acres of drained land, other than to indicate it ranges from 0.75 sec. ft. to 2.0 sec. ft. per 1000 acres of drained land and varies at different times during the year.

ARTESIAN WELLS

Data are being secured on the artesian wells with reference to number, size, location, waste of water, depletion of the artesian basin through unrestrained flow and related matters, but will not be published at this time.

Montrose, Colorado, Nov. 11, 1914.

Mr. H. C. Getty,
Irrigation Div. Engineer,
District No. 4,
Montrose, Colorado.

Dear Sir:

Replying to your letter of recent date requesting information regarding seepage conditions under the Uncompahgre Valley Project and the progress made in reclaiming lands so affected, I will say, that, while the subject is a very important one not only under this Project but in all irrigated sections as well, and worthy of much longer discussion than it is possible to submit at this time, I herewith submit some general statements on conditions as we have found them throughout the Uncompahgre Valley.

Using the data obtained from reports of the different Reclamation Engineers together with personal observations and data gathered during our operations in drainage work in this Valley, it has been estimated that 35% of the land under the Project is in need of artificial drainage. Approximately one-half of this area is too wet or excessively alkalied to produce any kind of crops whatever, while through the balance of the land in need of drainage, the water-table is too close to the surface to permit a full maturity of the crops planted.

It is believed by a great many that the excessive rise of the ground water-table is due to the leakage from the large canals. While this is true in a few instances, it has been found that the largest per cent of the water that is causing the seep and alkaline condition is the water absorbed by the soil on the irrigated lands above.

Up to the present time there have been no Drainage Districts formed or organized in the Uncompahgre Valley which may be attributed mainly to three facts. 1st. That the majority of seep-affected bodies of land are small individual tracts which are widely scattered, and owing to the ample slope of the surface, outlets for the drains are obtained within short distances of the area to be drained with very little difficulty. 2nd. In some localities where the affected area is large enough to necessitate the organizing of a District, the majority of land owners, whose lands would be included, are non-residents of the Valley and consequently it is difficult to get the matter before them in a necessary manner for forming such a district. It could be done, however, with no little amount of time and expense, but no one individual cares to assume the responsibility. 3rd. The land-owners who are local residents of the Valley having affected areas large enough to comprise a fair sized District have not as yet realized the importance of such work and are skeptical of the feasibility of Drainage Districts.

As a result of these chief conditions, all of the drainage work so far has been individual work. It is only a question of a short time until District work will be undertaken and if one District could be organized and completed, the others would soon fall into line.

During the four years that our company has been engaged in the Reclamation of Alkalied Land by Scientific Drainage, we have installed over sixty miles of tile and successfully reclaimed approximately 7000 acres of land in the Valley at an average cost of $35.00 per acre. The land, so reclaimed, is now bearing full crops and in most cases the crops have paid off the cost of reclamation.

There are two general soil and sub-soil conditions existing in the Valley. On the East side of the Uncompahgre River is found the sandy adobe soil underlaid with a shale sub-soil, while on the West side of the River the soil is composed of a sandy-loam with a sand or gravel sub-soil. In connection with each of these general conditions there is found a great variety of sub-soil formations, and it will no doubt be interesting to learn that of all the projects installed, we have found no two sub-soil formations exactly alike or requiring the same system of drainage. Each project is a separate study in itself.

The sizes of tile we have been using are 6", 8", 10" and 12". The 6" tile, however, are used only on short laterals having a steep grade. The time has arrived when larger tiles than twelve inch is needed and steps have been taken to promote the manufacture of sizes up to 27" by the local tile factories.

On the smaller projects the tile lines are constructed by hand labor, while the trenches on the larger projects are excavated with a trenching machine. Very seldom is a tile line constructed without the use of timber, as the soil of most of the work is so thoroughly saturated that it is impossible to keep the banks standing while the tile is being laid.

While the people of the Valley are beginning to realize more than ever the necessity of draining, and there is more drainage work, in proportion to the population of the Valley, being done than in any other one locality in the irrigated section of the West, it is still difficult to impress upon the mind of the water-user the absolute necessity for careful irrigation as a future preventative against seepage and in conclusion let it be said that if every farmer would use as his motto, "More cultivation and less irrigation", he would not only increase his present crop production but he would insure himself as well as his neighbor, in a great measure, against the spots, which every farmer dreads to see appear on his land, commonly known as seep.

Respectfully submitted,

(Signed) H. R. Elliott,
President,
THE ELLIOTT-MEAKER DRAINAGE CO.

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